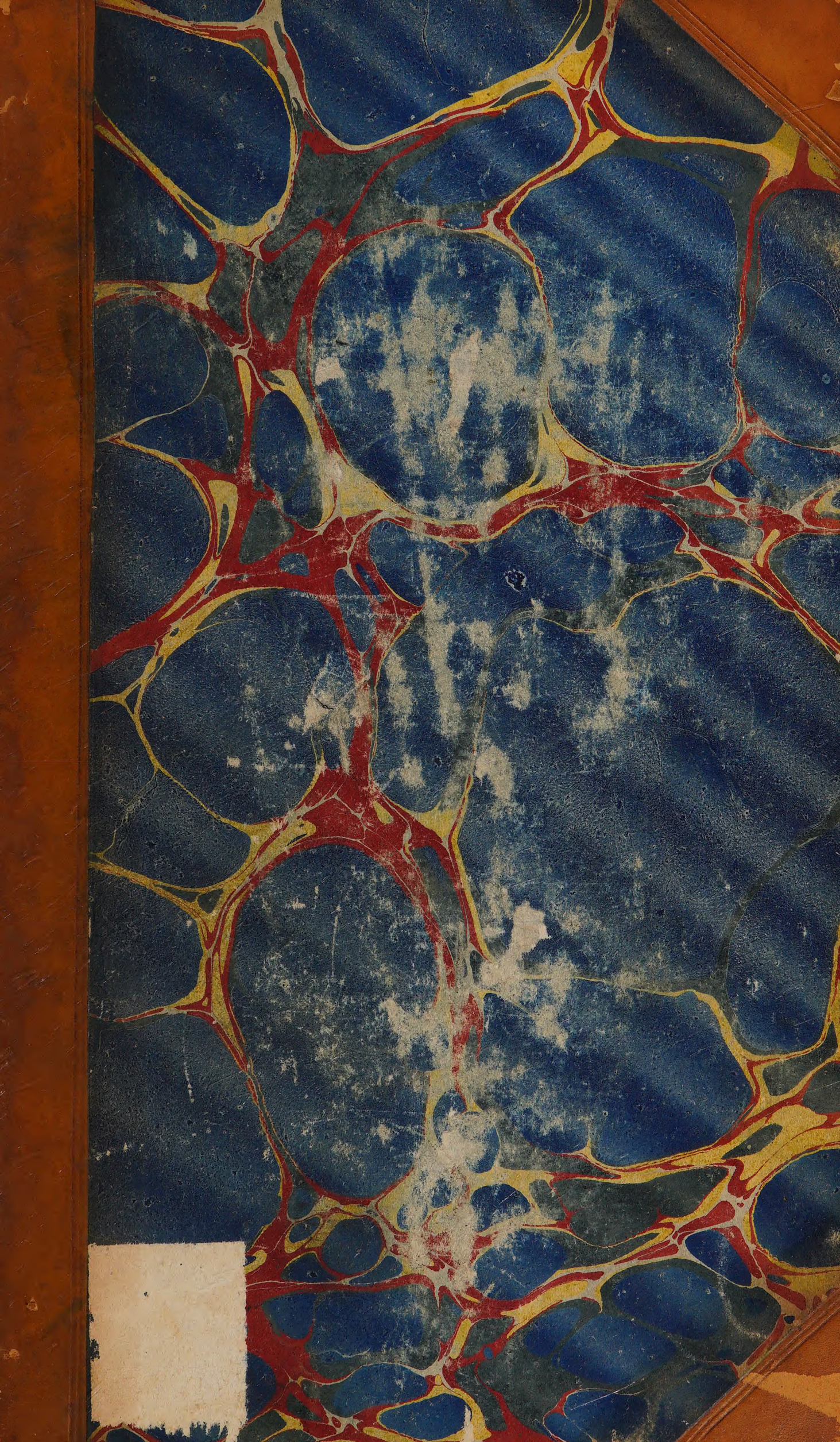

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John Bell

PHARMACEUTICAL JOURNAL

AND

TRANSACTIONS.

VOLUME VIII.

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THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. I.—JULY 1st, 1848.

THE PHARMACOPŒIA.

This is the season of the year at which we usually hear rumours respecting the probable appearance of a new Pharmacopœia, and it has been whispered rather loudly, that at the present time the current report is not without foundation. One party informs us that a friend of his has actually seen the paper on which the work is to be printed; another states, on what he declares to be good authority, that a portion of it is already in type.

We are inclined to believe the first of these statements, although we doubt the accuracy of the second. The paper may remain *incog.* in the warehouse *ad libitum*, but if the proof-sheets were extant, we think the fact would rest on more substantial evidence than mere rumour.

Under the impression, therefore, that the fiat has not yet gone forth, we take this opportunity of adverting to some important considerations in the compilation of a Pharmacopœia, confining our remarks exclusively to those matters which naturally occur to the mind of the Chemist, without in any degree interfering with the prerogative of the Physician.

The object of a Pharmacopœia is to furnish a medium of communication between the prescriber and the dispenser, by means of which, uniformity in the preparations may be insured, and mistakes or misunderstandings avoided. The selection of the remedies and the regulation of the doses, must of course rest entirely with the College of Physicians. On behalf of the Chemists we claim the privilege of making a few suggestions, chiefly in reference to that perspicuity and clearness in the language and terms employed, which shall remove all doubt as to what are the intentions of prescribers.

It must not be forgotten, that while the Pharmacopœia is, according to law, binding on the dispenser, those who prescribe are unfettered, and may use their own discretion as to the adoption or rejection of any innovations.

It may, therefore, be stated as a general rule, that all changes in the preparations or terms in the Pharmacopœia, are attended with more or less inconvenience, and no change should be made unless the advantage be more than an equivalent for this inconvenience. Another important rule which should be observed is, that no term or name hitherto known to designate any particular

preparation, should be used with any other meaning, or applied to a different preparation.

In the Pharmacopœia of 1836, this rule was entirely overlooked in many instances, which has given rise to much mischief and many mistakes. In some cases these mistakes may lead to no serious consequences; as for instance, if carbonate of soda or potash be ordered by a practitioner of the old school, and interpreted according to the new nomenclature, the patient, it is true, would not receive the medicine intended, but the result would be attended with no danger.

But if the propensity for new nomenclature were to be extended to calomel and corrosive sublimate, many deaths would be the inevitable result. According to some modern chemical authorities, corrosive sublimate is now termed *the chloride of mercury*. This term is applied in the present Pharmacopœia to calomel. By adopting the new nomenclature in the forthcoming Pharmacopœia, the same term would be applicable either to *calomel* or to *corrosive sublimate*, according to the date of the prescription, the will of the prescriber, or the extent to which the members of the profession might think proper to study the details of Pharmaceutical nomenclature. In the inquests which would result from such a "*double entendre*" in the Pharmacopœia, the only proper verdict would be manslaughter against the authors of the work.

We are not apprehensive that this alteration will be made, but state the case as an illustration of a principle which has too often been overlooked by the college. Those who stand behind the counter to interpret and prepare prescriptions, are feelingly alive to the evil attending the use of words with double meanings in the Pharmacopœia, as they are frequently obliged in such cases to keep their customers waiting for the medicine, while they are in search of the doctor in order to ascertain his intention. We believe the opinion is gaining ground, that it is vain to attempt in a Pharmacopœia to keep pace with the progress of chemical science, and that for the purposes of the work the old name is as good as the new one, although it may not be chemically correct. To clear up all doubt, the modern views of scientific Chemists might be stated in a note, without creating perplexity by altering the officinal name in the text.

If this principle of perspicuity be important in the chemicals, it is quite as much so in the arbitrary Pharmaceutical formulæ. Any change in the strength of a powerful tincture or other active preparation, would be attended with a serious result, unless the name of the preparation were so completely altered so as to remove all doubt on the subject. In illustration, we need only advert to the perplexity which for several years existed in reference to hydrocyanic acid, for although the word "dilutum" was

added in the Pharmacopœia, this was not generally adopted by medical men, and Chemists were constantly accused of using an inert preparation because they adhered to the Pharmacopœia, while the prescriber intended Scheele's acid to be used, which is nearly three times the strength.

Acidum Aceticum is another example; being used in two consecutive Pharmacopœias to denote two preparations, one of which is more than six times as strong as the other.

Another rule should be observed in the adoption of new preparations; namely, the name applied to them should not be such as would be likely, when written, to be confounded with the name of any other preparation. For instance, if it were proposed to introduce a syrup of cochineal, the term *syrupus cocci* would be improper, as it would when written be similar to *syr. croci*; and a mixture might be alternately red or yellow, according to the interpretation of the equivocal word. We have several times seen prescriptions in which it was difficult to decide whether *liquor potassæ*, or *liquor potassæ arsen.* was intended; the obscurity in such cases being increased by the contractions usual in prescriptions. In the case of the red and yellow mixtures, the patient would be alarmed without a cause; in case of an accident between the *liq. potas.* and *liq. potas. a*, he might be poisoned without knowing why.

With respect to the formulæ for the preparation of Chemicals, it may be questioned whether an accurate description of the result required would not be more useful than detailed instructions as to the method of manipulation. The latter might be mentioned in general terms; but the practical Chemist is generally in advance of the Medical Profession in matters which relate to his own particular department.

We can appreciate the difficulties which beset the authors of the Pharmacopœia in undertaking to produce a work founded on practical experience in the manipulations of the laboratory, an avocation not forming a part of the ordinary duties of the Physician.

This circumstance, coupled with the desire which they naturally feel to bring the work up to the present standard of Pharmaceutical knowledge, may probably account for the delay in its publication.

We fully concur in the following observations on

PHARMACEUTICAL NOMENCLATURE,

BY MR. EDWARD THOMPSON.

The appearance in your last number of a letter from Mr. Lewis Thompson, "on the composition of the so-called Sesqui-carbonate of Soda," with the editorial remarks prefixed, induces me to give expression to a feeling, which I believe extensively prevails among

Chemists and Druggists, on the folly of the present mode of naming chemical substances in the Pharmacopœia. The change of names which occurs by authority, at intervals of a few years, is productive of no little confusion between those who prescribe and those who compound medicines. The utmost circumspection, and sometimes professional knowledge on the part of the compounder, too little appreciated by the Physician or the public, is often necessary to prevent this confusion, resulting in fatal mistakes—mistakes which it is the special purpose of a Pharmacopœia to prevent. And what advantage is there to counterbalance so grave an inconvenience? Is it that by the use of new-fangled chemical names the Pharmacopœia assumes a more imposing scientific appearance? Men of real science are not likely to be led away by such a mere appearance. That it does not always indicate any really scientific precision, let your correspondent's letter and your own remarks testify. Here is a substance formerly well understood as carbonate of soda. Mr. Phillips analyzes this salt, probably prepared in an imperfect manner, and pronounces it to contain three atoms of carbonic acid to two of soda, and forthwith the College of Physicians change the name to *sesqui*-carbonate of soda. An analysis of a more perfect preparation of the same substance is subsequently made, and it is found to contain two atoms of carbonic acid to one of soda. The name, it appears, must now be changed to *bi*-carbonate of soda, until further chemical discoveries, or a complete revolution in chemical nomenclature, at no distant day, requires another alteration. Nor has the mischievous folly ended here. We had a preparation well known as sub-carbonate of soda. In order to sacrifice convenience, safety, and common sense at the shrine of Chemistry, it must now be called carbonate of soda, so that when this name now occurs in a prescription, the bewildered compounder has to decide on such questions as the following:—"Does the prescriber belong to the old school or the new?—Is he young or old?—Does he uniformly use the new names?" And if he cannot answer these inquiries satisfactorily, he must get out of the dilemma as well as he can. It may be said that it is the duty of the Physician to employ the new names only, and that of the Chemists and Druggists to understand them accordingly. But the fact is, medical practitioners, especially in the country, *will* not always follow the caprices of their brethren in London; and between the two, the Chemist is left, especially where energetic medicines are concerned, in a pleasing state of uncertainty, for which he will be thankful *both* to the prescriber and to the College, and the patient may be thankful if he escapes with his life. Now, if we are to have a new edition of the London Pharmacopœia, in the name of humanity and common sense let us follow the worthy example of the Edinburgh College, and have a stand made on some well-known names. Adopt the present ones, if you please, but let us have no further change. "The more decorous dress of science or philosophy," says the Edinburgh College, "has been dearly purchased at the cost of being compelled to follow the changing fashion of the day."

Otley, June 6th, 1848.

THE MEDICAL REGISTRATION COMMITTEE.

We regret to be informed that the indisposition of Mr. Wakley has in some degree impeded the progress of this Committee, which, however, has now resumed its labours, and is still engaged in the examination of witnesses.

From some correspondence which has been published in the *Lancet*, it would appear that the selection of witnesses has not been satisfactory to certain members of the profession, and it has been proposed to appoint a Committee of Medical Practitioners to consider the subject, and to recommend such parties as they may think most eligible for examination before the Parliamentary Committee.

In an undertaking so comprehensive and intricate as that which is before the Committee, it is desirable to conciliate all parties, and to pay due respect to such reasonable suggestions as may be offered in reference to the evidence to be received. With all the precautions that can be taken, it will be extremely difficult to ward off opposition, since the movement itself is to a certain extent a trial of strength between several parties, and the only chance of success consists in giving each a due share of impartial consideration. Any attempt to favour one party to the prejudice of others, would be like springing a mine under the Bill which would blow it to atoms. We have in reference to other Bills under similar circumstances predicted the same result, and experience has shown that no partial, one-sided, or undigested measure can meet with any other fate.

We trust the Committee now sitting will profit by the experience of their predecessors, and investigate the subject in all its bearings in reference to all the conflicting views of the several parties concerned; and that this investigation will be conducted with a unanimous determination to arrive at an impartial conclusion.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

ELECTION OF PRESIDENT, VICE-PRESIDENT,
AND OTHER OFFICERS OF THE PHARMACEUTICAL SOCIETY.

At a Meeting of Council, held Wednesday the 7th of June, the following officers were elected for the ensuing year:

President	Mr. T. N. R. Morson.
Vice-President	Mr. Peter Squire.
Treasurer	Mr. R. H. Pigeon.
Librarian and Curator of the Museum	Mr. Redwood.
Secretary	Mr. G. W. Smith.

LIST OF MEMBERS,
ASSOCIATES, AND APPRENTICES (*continued*).

Elected May and June.

MEMBERS.

Driffield	Laybourn, Christopher, Exchange Street
Harrogate	Greenwood, John, Parliament Street
London	Banks, Alfred J. H., 66, High Street, Camden Town
	*Hills, Thomas Hyde, 338, Oxford Street
	*Windus, Arthur Edward, 235, Strand
	Windus, Charles Rogers, 235, Strand
Plymouth	*Tracey, William B., 17, Whimple Street
Seaford	Davids, George Ware, High Street
Sheffield	Maunder, Frederick, 95, Hoyle Street
	Wilkinson, John, 18, Union Street
Sherston Magna	Richards, John
Torquay	Kendall, John M., 6, Carey Parade
Tottenham	Wall, William James
Truro	Hall, Thomas C., 6, St. Nicholas Street
Tunbridge Wells	Wickham, William, High Street

MAJOR EXAMINATIONS.

Braithwaite, John Charles	Bartonsham House, Hereford
Copeland, John	Lindfield, Sussex
Evans, Thomas	Rhuabon, Denbighshire
Giles, Richard William	Clifton

Harrison, Robert Hooper . .	Southampton
Moore, Edward	Brighton
Pochin, Henry Davis . . .	Northampton
Sutton, William	Halstead, Essex

MINOR EXAMINATIONS.]

Barker, William Baylis . . .	Liverpool
Brockelsby, David Hyde . .	60, Westminster Bridge Road
Jeffery, John Augustus . . .	Clifton
Porter, Augustus Frederick .	228, Piccadilly

REGISTERED APPRENTICES.

APPRENTICES.	RESIDING WITH	TOWNS.
Atton, John Thomas .	Mr. Millns . .	Spalding
Cubitt, Charles . .	Mr. Cubitt . .	Norwich
Kirkman, George B. .	Mr. Deane . .	Clapham
Loosemore, Philip. .	Mr. Knott . .	Exeter
Pritchard, Joshua . .	Mr. Davies . .	Chester
Rewe, Robert . . .	Mr. Tanner . .	Exeter
Rolfe, William A. . .	Mr. Spencer . .	Wokingham
Sturton, Richard . .	Mr. Sturton . .	Peterborough
Warren, Edward F. .	Mr. Craske . .	Holt
Whitsed, John . . .	Mr. Woodroffe .	Stamford
Wright, Joseph . .	Mr. Cubitt . .	Norwich
Zeal, Thomas . . .	Mr. Tanner . .	Exeter

TRANSACTIONS OF THE BRISTOL CHEMISTS' ASSOCIATION.

On Tuesday, May 9th, a Lecture on "Capillary Action" was delivered before the Members of the Association, by Mr. G. F. Schacht. The object of the lecturer, was to show that these actions involve no specific or peculiar principles, but are dependent upon certain general laws, some of whose influences in the ordinary concerns of life were pointed out and explained.

On Tuesday, May 23, the Association was honoured by the presence of the Mayor of Bristol. His worship having kindly taken the Chair, a Lecture was delivered on

THE CHEMISTRY OF THE DISINFECTANTS,

BY — GRIFFIN, ESQ.

The lecturer commenced by observing, that at the present time, when sanitary measures are beginning to occupy something like a due share of public attention, it peculiarly behoves all in any way connected with the "Profession of Health," to be well acquainted with the subject in all its bearings. The social and financial side of the question is now familiar enough to all, but much remains to be more generally known in its scientific aspect, and for the want of this knowledge, the most ridiculous statements

concerning the chemistry of disinfection, have been made and believed. The subject of the lecture might be divided into three sections : the nature of the putrefactive process ; the chemical properties of the products arising therefrom, particularly those most injurious to health ; and, lastly, the nature and re-actions of the substances employed to absorb or decompose them, termed "disinfectants." To render the whole more complete and comprehensive, Mr. Griffin gave a rapid sketch of the leading laws connected with Chemical phenomena, and illustrated the effects of *cohesion* and *adhesion* by various experiments, dwelling particularly on the attraction between solid bodies and gases. Having shown that a red-hot body causes the explosive combination of oxygen and hydrogen gases, he immersed a piece of spongy platinum in a jar of the mixture, which became red-hot and ignited it. The platinum condenses the gases on its surface sufficiently to enable them to combine, and the heat evolved by the union of successive portions, quickly raises the platinum to incandescence. To show that this is occasioned by the attraction of the surface of the metal, he moistened the platinum sponge, when it had no action on the gases, the metal being enveloped in a film of water, but on driving this off by a red-heat, it regained its original efficacy.

Permanent chemical combination was next dwelt on. The total change of properties which frequently attends it, was strikingly shown by connecting two large cylinders of oxygen and nitric oxide, which immediately passed from the state of neutral invisible gases, to that of a highly-corrosive dense orange-coloured vapour. Attention was drawn to the relative capacities of the vessels containing the gases,—that containing the nitric oxide being double the length of the oxygen one—these being the proportions in which the gases combine ; and the importance of the all-prevailing law of combination only taking place in certain fixed and definite proportions—the keystone of the whole fabric of nature—pointed out.

The composition of organic matter was then considered. Animal bodies are made up of a great variety of compounds, all formed by the union in various proportions and manners, of a very few elementary or simple bodies, namely, oxygen, hydrogen, and nitrogen gases, and solid carbon, with small portions of sulphur and phosphorus. These proximate principles are of very complex and unstable structure ; in fact they are only preserved intact by the mysterious power of vitality—the moment that ceases, the ordinary affinities of their elements resume their sway, and they arrange themselves in simpler forms, most of which are gaseous, and mix with the surrounding air. The chief products of the putrefaction of animal matter, are, water, carbonic acid, ammonia, carburetted, sulphuretted, and phosphuretted hydrogen, and a solid, earthy residuum. Vegetable matter consists of the same leading elements, with the exception, perhaps, of phosphorus, and nitrogen and sulphur are comparatively rarely present, therefore its decomposition is somewhat less offensive and noxious. Water carbonic acid, and fetid carburetted hydrogen are its chief products; the two latter are evolved in abundance in warm weather from the slime at the bottom of stagnant water.

Several conditions are necessary for the putrefactive process. The first is a moderate temperature, for meat is preserved all the winter in severe climates, and hence fish is packed in ice in the summer. Moisture is indispensable, as we daily see. Citric and tartaric acids are unalterable in the air, but their solutions speedily decompose and mould, even when combined with a base, as in tartar emetic. Meat thoroughly dried is very slowly changed, and the preservative powers of salt depend, in a great measure, on its abstracting the juices of the flesh. The presence of air, or rather oxygen, is requisite, and greatly modifies the results. Meat can be kept sweet for a long time under water,

which is prevented from absorbing air by a coating of oil; potted meats are covered with melted butter with the same object. Gay Lussac has shown that milk may be kept fresh for a long time, by boiling it repeatedly to drive off the air; and in Appert's process, where provisions are par-boiled in tin canisters, so as to convert the small quantity of included air into carbonic acid, and are then hermetically sealed up, all change may be prevented for any length of time.

The chemical properties of the chief noxious gases evolved were then illustrated, neglecting the carbonic acid and carburetted hydrogen, as of comparatively little importance. *Sulphuretted hydrogen* was considered first, and its leading properties and decomposition by various agents shown. Its deleterious nature was peculiarly dwelt on. Lavoisier found a greenfinch perish in air containing only one part in 1500 of this gas; a middle-sized dog in air contaminated with a $\frac{1}{800}$th part, and a horse died in a stable into which this gas found its way from a neighbouring drain, which proved, on analysis by Thénard, to contain only one part in 150 of air. Dr. Chaussier has proved that even sufficient is imbibed by the skin, without any inhalation, to destroy life, four rabbits died in a quarter of an hour when their bodies were immersed in bags of this gas. Mixed with air, it causes when respired, nausea, vertigo, and faintness, and when constantly inhaled in the minutest portions, as in the neighbourhood of graveyards, open drains, &c , it gives rise to squalor and lingering fevers. Prof. Daniell found it present in the sea-water on the western coast of Africa, and ascribed the fatal effects of the country, "the grave of Europeans," to its presence, probably with justice. In excavating the Thames Tunnel, the workmen were much annoyed and impeded by sudden outbursts of this gas, from some subterranean source; the water that trickled down the walls was charged with it, and all means to get rid of it failed, till the completion of the shaft caused thorough ventilation. All the fleshy tissues contain sulphur, and the whole of this is evolved, during decomposition, in the form of this deadly gas. Its copious evolution by clearing dry night-soil, was shown by its action on lead paper. Whenever this gas and *ammonia* come in contact, as when they are simultaneously evolved, they combine to form a saline compound, for sulphuretted hydrogen, is, strictly speaking, an acid. This was shown by connecting a large globe of dry sulphuretted hydrogen, with a jar of ammonia, when they instantly combined into a dense cloud of glittering crystalline particles, like sleet, which gradually condensed on the sides of the vessels in large groups of transparent, radiated, colourless prisms. When the hand was applied to any part of the globe, the hydrosulphate speedily disappeared; and on the contrary, condensed far more thickly on any spot which was cooled by the application of ether, showing its high degree of volatility, which has rendered it useful as a very delicate thermoscopic test in experiments on radiant heat. Its fumes are to the full as deleterious as free sulphuretted hydrogen; indeed, Mr. Osborn of Southampton, affirms he has found them more so. As all animal matter contains far more nitrogen than sulphur, the whole of the sulphuretted hydrogen is evolved in combination with ammonia; but during the putrefaction of vegetable bodies, which may contain sulphur, but no nitrogen, *free* sulphuretted hydrogen may be given off. Much ammonia is also generated during decay, combined with acetic and carbonic acids; but as both of these salts are volatile, as well as the hydrosulphate, they gradually fly off, and the smell of the latter is very evident near rotting dung, and in stables. It is very important to prevent this loss, as far as possible, by combining the ammonia with some fixed inorganic acid, as the sulphuric, so as to form a non-volatile salt, for it is invaluable to vegetation, and is one of the most essential portions of manures. After briefly alluding to the nature of

phosphuretted hydrogen, a very noxious gas, the lecturer entered upon the application and re-actions of disinfectant substances, applied to fetid or decaying organic matter, to remove these offensive compounds.

Charcoal.—The action of this body seems to depend almost entirely on mechanical absorption, and is strictly analagous to that of spongy platinum. It condenses large quantities of gases, and gives them out unchanged on being heated. A piece of box-wood charcoal, strongly ignited, and cooled under mercury, on being allowed to ascend into a tube filled with sulphuretted hydrogen, soon condensed nearly the whole of it, and a solution of the gas, shaken with powdered charcoal and filtered, was not even discoloured by nitrate of lead. It also absorbs fetid organic matter. Water is kept sweet for years at sea in casks charred inside; the best filters for water are those consisting of alternate layers of powdered charcoal and siliceous sand, which at the same time strain and purify it, but the charcoal requires to be occasionally renewed or re-burnt. Water in which toast has been steeped, is rendered more wholesome, from the purifying powers of the external coating of charcoal extemporaneously formed; but the bread should be thoroughly charred for this purpose. Charcoal rubbed over, or boiled with tainted meat, renders it sweet, particularly if thrown red-hot from the fire into the water, previously boiling; it removes the musty smell which clothes acquire by laying by; and Dobereiner asserts, that when newly burnt, it will abstract the smell of tobacco-smoke from rooms. It is an excellent tooth-powder, as it corrects the fetor of the mouth, but as commonly sold in boxes, is of no more use than so much magnesia. It should be strongly ignited in a fire or crucible, quickly rubbed to powder in a mortar, and immediately transferred to stoppered bottles, which should be opened as little as possible, for, like spongy platinum, it loses its efficacy by exposure to air, but regains it when heated red-hot, even after use, as the organic matters and gases absorbed are either volatilized or decomposed. The value of the finely-divided carbon of which vegetable mould chiefly consists, and the efficacy of peat charcoal as a manure, depend upon this property of absorbing moisture and nutritive gases, and presenting them in a condensed state to the roots of plants. The black liquid that runs from dunghills, on being passed through charcoal, becomes nearly colourless and inert, while the latter acquires high fertilizing powers, hence, for economy, manure heaps should always be raised on a bed of this substance. It also removes colouring organic matter, and is largely used in whitening saline solutions, as in the manufacture of citric acid and cream of tartar. A dark sherry wine, on being shaken with powdered charcoal and filtered, was rendered almost colourless. Vegetable bitters lose their astringency, and rum its peculiar flavour, by its action; oils are rendered sweet and clarified by filtration through it; and some continental bleachers render thread goods exquisitely white by boiling them in water with a little powdered charcoal. That prepared by the calcination of bones, blood, or offal, is most efficacious for these decolourizing purposes.

The properties of *Chlorine* were then detailed and illustrated. It decomposes most organic substances, from its powerful affinity for their hydrogen. This was shown by its bleaching green leaves, and inflaming liquor ammoniæ and spirits of turpentine, the carbon of the latter being separated in the form of a dense black smoke, while the chlorine combined with its hydrogen. Hence it instantly and completely decomposes sulphuretted hydrogen, liberating the sulphur, and modifies fetid organic matters in the atmosphere. It is generally applied, for convenience, combined with lime, from which it is slowly evolved in the air from a cause sometimes not clearly understood. It is united to the base by so feeble an affinity, that even the weakest acids set it free, by combining with the lime in its stead.

Hydrochloric acid, on being poured into a solution of chloride of lime, liberated chlorine with effervescence, recognised by its action on copper leaf. Even carbonic, though so feeble an acid, effects the same change, and the gradual evolution of chlorine from this compound is due to the lime absorbing the carbonic acid present in the atmosphere. On blowing air from the lungs, which is loaded with carbonic acid, through a solution of chloride of lime, this effect was evident; the liquid became milky, from the formation of carbonate of lime, while the blue colour of litmus, with which it was mixed, disappeared in proportion, from the bleaching power of the chlorine evolved. When solution of chloride of lime is used to sprinkle the floors of sick rooms, it leaves insoluble stains of carbonate of lime. These may, it is true, be removed by vinegar, but chloride of soda, sometimes called, from its discoverer, "Labarraque's Disinfecting Fluid," is far better, as the resulting carbonate can be removed by a wet cloth. By breathing fumes of chlorine from this compound, Mr. Roberts was enabled to traverse the sewer of the Bastile, which had been closed for thirty-seven years, and was full of sulphuretted hydrogen; and Dr. Faraday used twelve hundredweight of salt and oxide of manganese, and as much sulphuric acid, in evolving this gas to disinfect the Milbank Penitentiary.

Fumes of *nitric acid*, formed by heating a mixture of nitre and sulphuric acid, are used in disinfecting inhabited places where chlorine would be inadmissible from its deleterious nature, but it is far less efficacious. It also abstracts the hydrogen of organic matter, to which it imparts a portion of its oxygen, of course modifying the nature of the substances on which it thus acts.

Two of the leading products of putrefaction, ammonia and carbonic acid, are absorbed by the vegetable world, and thus revert by the slow mutations of the chemistry of nature to the nourishment of those living beings by whom their elements were originally assimilated. Thus, matter traverses a triple circle of changes, from its simplest inorganic state to the higher vegetable one, and from that to the still more complex animal form, on the decay of which it reverts to its simplest state, to undergo again the same round of change. "Thus," as the eloquent Dumas observes, "the study of putrefaction, which at first sight appears calculated to inspire only sentiments of repugnance, acquires a peculiarly philosophical interest, by revealing to us a chain of phenomena most admirable in their simplicity." Now that population, hourly increasing, is trenching closely on the means of subsistence, it becomes more than ever important to increase the fertility of the soil to the utmost of our power. The action of vegetation is to drain it of ammoniacal and alkaline salts, earthy phosphates, and soluble organic matter, and when these are exhausted, it becomes too "poor" to grow anything profitably on it without a season of rest. This period may be protracted by having a *rotation of crops*, of which each requires a peculiar aliment, so arranged as to use up what was left by their predecessors. But sterility must eventually arrive; and if the land is to continue in constant cultivation, we must replace what it has lost by artificial means. For this purpose we fetch the offal of marine birds from remote islands in the South Seas, paying enormous freightage, which, of course, ultimately comes out of the pocket of the consumer, while millions of tons of equally valuable manure are left to stagnate in the drains and cesspools of our large towns, spreading fever and death, or, by the new bill, are to be washed down to poison the rivers. If we drew a lesson from the wise economy of Nature, who makes nothing in vain, and treated this matter by the methods which modern science points out, we should have an abundance of home-grown manure, which would increase the produce of the land, while the health of our large towns would be proportionably im-

proved, for private interest would then be concerned in the speedy removal and collection of the sewerage. Future ages will hardly credit that in our densely-populated country we should, in the nineteenth century, wantonly waste the proper nourishment, directly of that grain, and indirectly of that animal food, on which we depend for daily subsistence. Civilization has brought us into an artificial state by penning up myriads in a small compass. It is for the advance of civilization to discover and apply the means of distributing and restoring to the soil a portion of those constituents of which it is continually draining it. An idea of the value of night-soil as a manure may be formed from the careful experiments of M. Girardin, who found that a soil, which, when left to itself, produced three bushels of grain for one sown, gave the following number of bushels when manured with equal portions of the substances specified:—Dried leaves and vegetable matter, 5; stable manure, 7; horse-dung, 10; human urine, 12; human excrement, 14; the latter producing nearly five times that of the natural capability of the soil, and double that produced by ordinary farm-yard manure. Looked at merely in a *pocket-light*, the loss is seen to be enormous. Dr. Miller, in his evidence before the Committee of the House of Commons, showed that the ammonia, earthy phosphates, and organic matter, poured to waste into the Thames from one sewer alone (that called the King's College Pond Sewer), could not be worth less than £64 per day, or £24,000 annually, and he estimated the value of all the sewerage of the metropolis at half a million sterling yearly. Dr. Lyon Playfair stated before the same Committee, that a pound of urine contained all the ingredients necessary to be added to the soil to grow a pound of wheat; and Professor Johnston states that the solid matter in urine is worth more than guano at £9 or £10 per ton.

The lecturer then reviewed the application of *metallic solutions* to the disinfection of the sewerage, and critically examined the conflicting statements and mystifications of plain chemical facts, so freely bandied about by the rival nostrum-mongers. All these liquids act in the same way—namely, they decompose hydrosulphate of ammonia, forming, with the elements of the gas, an insoluble metallic sulphuret and water—while the ammonia combines with the liberated acid to form a fixed salt, whereby it is all preserved for agricultural use. *Chloride of zinc* was the first on the list, a solution of which forms Sir W. Burnett's patented specific. This gentleman, who is the Director-General of the Medical Department of the Royal Navy, took out a patent in 1840 for chloride of zinc as an antiseptic, to prevent the dry-rot in timber, and furnish a cheap substitute for the Kyanizing process (saturating with corrosive sublimate). It has been applied in this way with great success, and a large apparatus has recently been completed in Woolwich Dockyard for this purpose, consisting of a huge wrought iron tube, eighty feet by six feet, into which the timber is run on a tramway. The air is then exhausted, and on the zinc solution being admitted it is forced into all the pores of the wood, the pressure being increased by a force-pump. It is likewise found very valuable as an injection to preserve anatomical subjects, for which purpose it is constantly used in the theatre of King's College Hospital and elsewhere, as it preserves their colour and texture without injuring the edges of the steel instruments like solution of corrosive sublimate. Dumas says that the specimens prepared by M. Sucquet's process (injecting with solution of sulphite of soda and steeping in chloride of zinc) retain all the volume and elasticity of the flesh without any alteration in the air. This preparation would be an elegant substitute for chloride of lime for domestic purposes, as it not only has no smell, which renders the latter so objectionable, but is not affected by exposure to air for any length of time, while it would always be ready to act on sulphuretted compounds; and the pre-

cipitate produced, being white, would not cause an unsightly appearance. It is completely decomposed by hydrosulphate of ammonia, but a very small portion of the zinc is precipitated by free sulphuretted hydrogen—the acid disengaged preventing further action. This has been strongly urged by the advocates of M. Ledoyen's nostrum—a solution of *nitrate of lead*, which has the advantage of being completely precipitated under all circumstances, and in the presence of acid, by free sulphuretted hydrogen. But the fact has been overlooked that these solutions are used in a very diluted state, and I have found, by careful analysis, that from a solution in the proportion of one pound of the chloride of zinc in 112 pounds, or one hundredweight of water, ninety per cent. of the zinc present is thrown down by *free* sulphuretted hydrogen, a proportion more than sufficient when hydro-sulphate of ammonia is the main substance we have to deal with. There is no doubt that solutions of lead are more completely deodorizing, and Mr. Calvert states that there is a marked difference in their application : in fact, a moderate current of sulphuretted hydrogen is so completely absorbed by a solution of lead, as not to be perceptible to the smell. Mr. Calvert asserts that a solution of zinc acting on a mixture of sulphuretted hydrogen and hydro-sulphate of ammonia, would evolve the gas from the latter salt. This is a mere unfounded chimera ;—both would be fully fixed and precipitated. The complete and instantaneous action of lead solutions would be advantageous for domestic purposes ; but they are, unfortunately, precluded from this application by the black colour of the precipitated sulphuret. The sulphate of zinc acts in exactly the same manner as the chloride, and is quite as efficacious. Mr. G. found that precisely the same proportion (ninety per cent.) of the zinc is precipitated from a solution of this salt in 112 parts of water, as from the similar solution of the chloride. It would be absurd to use a valuable metal to waste in preparing the chloride, while large quantities of the equally useful sulphate are thrown away. Should this salt come into extensive use for this purpose, it would give a great impetus to the numerous industrial applications of voltaic electricity, the whole of the zinc employed in procuring that force being now thrown away in the form of sulphate. If, however, the chloride were required for certain purposes, it could be cheaply prepared by the alkali works, by running their waste dilute hydrochloric acid over crude zinc, by which they would use up a very troublesome product.

The question next examined was one which has been much discussed and misrepresented, namely, how far the products formed would prove injurious to vegetation, when the disinfected night-soil was subsequently applied as manure. It has been asserted that the sulphurets of lead and zinc would oxidate, and become soluble, when, as it is well known, they would act as poisons on vegetation. To set this at rest, Mr. Griffin produced two garden-pots sealed at the bottom, containing potatoes planted when just sprouting, the one in soil mixed with one-fortieth part of sulphuret of lead, and the other in mould containing one-eightieth part of sulphuret of zinc. Both plants had grown a foot high, and appeared thoroughly healthy and strong. By digesting portions of the soils with water, and applying hydrosulphate of ammonia, the absence of any soluble metallic salts was shown ; while by acidifying the water, filtering, and testing by iodide of potassium, and hydrosulphate of ammonia the actual presence of abundance of lead and zinc in the soils was demonstrated. Of course an excess of any undecomposed metallic salt would be pernicious, but this could hardly occur in practice. *Sulphate of iron* has been long known and used as a disinfectant. Pure proto-sulphate is not affected by pure sulphuretted hydrogen, but a mixture of proto and per-sulphate, or common copperas, is copiously precipitated by the gas

It has the great advantage of being cheap and abundant in commerce. It is valuable to add to the ammoniacal liquor of dung-hills, as it forms by double decomposition, with the volatile carburet of ammonia, carbonate of iron and sulphate of ammonia, a fixed salt. Both the sulphuret and carbonate of iron speedily pass into the state of red peroxide (which is inert, and contained in all soils) by the action of the air. Mr. Ellerman has patented a crude *pyrolignate of iron*, mixed with a portion of chloride, which is a valuable compound, as here the acid is efficacious as well as the the base—pyroligneous acid being one of the best antiseptics known—but it could not be produced so cheaply as the chloride of zinc, or sulphates of zinc or iron. Tar is a valuable ingredient in disinfecting mixtures : three pounds of tar will preserve twenty gallons of urine from putrefaction, and enable this valuable manure to be preserved or transported inoffensively. All these solutions are troublesome to apply, and require constant renewal ; but M. Siret has adopted a very ingenious imitation of the manner in which Nature filters the soluble portions from masses of fixed matter, as rocks and soils. He mixes up 205 parts of plaster of Paris and ten of charcoal with a solution of 200 parts of sulphate of iron and 25 of sulphate of zinc. This sets into a solid mass, which is placed at the entrance of a drain or sewer, and the liquids passing over it, gradually dissolve out the metallic salts and become disinfected. This plan is well worthy of universal adoption in dwelling-houses. The only disinfectants which act on phosphuretted hydrogen are chlorine and nitrate of lead—the former completely, and the latter partially, removing it.

The lecturer then gave a sketch of the methods which have been applied to economise the drainage. Dr. Ayres proposes to dry it by a steam-heat in a close chamber, and after abstracting the ammonia from the fumes by an extensive surface of sulphuric acid, to burn the fetid vapours by passing them through the furnace which heats the boiler. A company has been formed in London called "The Sewage Manure Company," to distribute the liquid sewerage to the neighbourhood of the metropolis by a system of pipes; but the scheme seems impracticable. Disinfection on a large scale, however, is now carried on in an extensive establishment a few miles from Paris. The night-soil being carefully collected in carts and discharged into large tanks, three acres in extent, it is then mixed with disinfecting substances, and the solid portions are eagerly bought at £3 10*s.* per ton. So little smell is evolved, that a stranger, it is said, might be ignorant of the nature of the process being carried on—hence no annoyance can arise, and the process only costs a few shillings per ton. In China the night-soil is carefully preserved and put out in tubs, to be carried away in boats on the canals which intersect that country, and it is spread over the land without further preparation. Thus China is enabled to support her crowded millions by her own resources, while we are obliged to lay the whole world under contribution through our system of wanton waste.

The exact nature of the causes of infectious and epidemic diseases has hitherto baffled the researches of science ; but there are strong reasons for supposing that they are occasioned by subtle effluvia in the air, probably of an organic nature, which elude the skill of the Chemist, but which being absorbed by the blood induce in it their own state of decay, or decomposition, as a little yeast will cause a whole vat of wort to ferment. The only disinfectant that can reach these is *chlorine*, which by being diffused in the air can be brought into intimate contact with them ; but it is folly to imagine, as had been pretended, that metallic solutions would abstract them from the atmosphere ; they have, in fact, signally and completely failed in practice, as might have been anticipated : hence these liquids should, strictly speaking, be termed *de-oderants*, not *disinfectants*. Putrifying matter may give off those organic poisons which may not be

perceptible to our senses, and if by the habitual use of disinfectants we get rid of the intolerable odours with which nature, perhaps kindly, accompanies them, we should only enable ourselves to live contentedly in a fatal atmosphere. The radical cure is to remove at once the sources of malaria by complete and systematic drainage, combined with plans for economizing the sewage matter. Many seem to suppose that it is chiefly the poorer classes who are interested in sanitary measures—there cannot be a greater error. Independently of the general vitiation of the air of cities, and the uncontrollable spread of epidemics once originated, many of the noble houses at the West-End of London and at our local West-End (Clifton) are little better than whited sepulchres standing over a magazine of death ; being built over stagnant cess-pools, constantly emitting vapours which undermine the health of their occupants. Thorough drainage must imperatively be provided at any cost.

Mr. Griffin concluded by thanking his audience for the patience with which they had listened to a discourse protracted far beyond the usual limits, and said that if what they had heard that night gave a clearer view of the chemistry of sanitary reform, and its paramount necessity, he should be amply rewarded for any trouble which he might have taken.

ORIGINAL AND EXTRACTED ARTICLES.

ON THE MANUFACTURE OF SUGAR IN BARBADOS.

BY GEO. FOWNES, F.R.S.
Professor of Practical Chemistry in University College, London.

The processes of the sugar manufacture of Barbados appear to have undergone but little alteration for many years past, and are nearly the same as those employed at a very early period in the history of the colony. A few of the more intelligent and enterprising planters have lately attempted the introduction of improvements with a zeal which does them honour, but from circumstances easily understood, the management of the great majority of estates is still the same as in the days of slavery.

The common process of sugar-making is too well known to need a lengthened description. The canes are crushed by a machine consisting of three vertical iron rollers, put in motion by a windmill, and the juice, after passing through a strainer, is received into the clarifying vessels, usually of the capacity of 300 or 400 gallons, where it receives the usual dose of lime or "temper," and a sufficient degree of heat to occasion the separation of an abundant *coagulum* of insoluble matter, part of which rises to the top in the form of scum, while the remainder subsides as a thick muddy deposit to the bottom of the vessel. The clear liquor is drawn off by a cock into one of the larger evaporating pans, and rapidly boiled down until its bulk is considerably reduced. From thence it is transferred to a smaller pan, and still further concentrated. The scum which constantly arises during the boiling, is removed by skimming, and reserved, together with the feculencies separated in the clarifying vessel, for the manufacture of rum ; it forms in

fact the ferment to the saccharine liquid, and replaces the yeast employed by the distillers of Europe. The concentration of the cane-juice is completed in the smallest of the series of pans, whence it is emptied or "skipped" by an ingenious contrivance, first into a copper cooler, and afterwards into a large shallow wooden crystallizing vessel, and stirred from time to time. In a few hours, the dark pasty mass of crystallized sugar and fluid molasses is found sufficiently firm for "potting" or "curing;" it is put into hogsheads perforated with a few holes, and there allowed to drain for a period of time varying from two or three days to a fortnight, the molasses being received into an open cistern beneath, covered with a strong framing of joists, upon which the hogsheads rest. The sugar is lastly "headed up" for shipment, and sent into commerce.

In the arrangement of the boiling-house plant, the evaporating and clarifying vessels are ranged in a row, and heated by a single fire, which is made immediately under the last and the smallest, the series of four or five terminating with the clarifier; they are usually made of copper, and surmounted with leaded slopes to retain the boiling and frothing liquor, which is transferred from one to the other, partly by means of a sluice in the slope, and partly by baling. The fuel is the "megass" or crushed cane of the preceding year, dried in the sun, and carefully preserved in a shed or in stacks; it burns rapidly, producing a powerful flame, which maintains the whole of the evaporating pans in a state of rapid and violent ebullition, besides imparting the requisite degree of heat to the liquor under clarification.

The juice as it flows from the crushing-mill, is frothy, turbid, and foul, but very pale in colour; after clarification carefully conducted, it becomes quite clear, but acquires the light amber colour of pale sherry or Madeira wine. In the evaporating vessels it becomes darker and darker, until when removed from the last and smallest pan to the cooler, it nearly resembles in colour and consistence ordinary tar. After crystallization, however, the greater part of the dark colouring matter drains away in the mother-liquor or molasses, leaving the crystals in the yellowish or brownish state familiar to every one in common raw sugar. Even this degree of colour, however, is in great part superficial, for if the crystals be washed with a little water or white syrup, they become nearly white.

In the process of tempering considerable judgment is required; enough lime in the state of lime-water, or milk of lime, should be added to render the liquid quite neutral, or perhaps better, with a very slight tendency to alkalinity. An excess of lime does great mischief, darkening still further the liquor, and injuring the product of crystallized sugar both in quality and quantity. From the variable nature of the cane-juice, according to the season, wet

and other circumstances, the quantity of lime required is found to vary greatly.

The skill and judgment of the sugar-boiler are again exercised in deciding on the most advantageous degree of concentration to which to bring the syrup in the last pan. If it be not pushed far enough, the product of sugar is greatly diminished; if, on the contrary, it be left for even a very few minutes too long over so fierce a fire, it is so far altered in properties as to be in great part rendered uncrystallizable. In both this and the clarification-process his usual, perhaps only, guide, is experience acquired by practice.

Such is the plan of operations yet almost universally followed, with occasional slight and inconsiderable variations, not only in Barbados, but in most of the West India Colonies. The greatest variations are in the crushing-mill; the power of the wind is used in Barbados, where it commonly blows with great strength and regularity during the three or four spring months of crop time. In the mountainous islands water-power is had recourse to, and where neither of these is available, steam power is used; coal being imported from England for the purpose of heating the boilers, and the megass reserved for the evaporation of the juice.

Before pointing out the defects of the present system of manufacture, it will be necessary to say a few words concerning the chemical composition of cane-juice, as far as it is known. Our information on this important subject is yet defective; it may be hoped, however, that the researches which Dr. Shier, aided by the wise liberality of the Government of British Guiana, has been enabled to make, added to those of other inquirers in the same field, may shortly throw considerable light on this great fundamental point.

Fresh cane-juice, from mature and healthy canes, possesses a very pale yellowish grey colour, a faint fragrant odour, and a powerfully sweet and somewhat fruity taste, to most persons very agreeable. It is somewhat thick and clammy, having a sp. gr. ranging from 1.070 to 1.090, and in some cases higher. It is turbid or opalescent from finely-divided suspended matter, and filters through paper with great difficulty and little increase of transparency. This turbidity is commonly a little increased by boiling, and sometimes a few small flocks separated. The juice is very faintly, though decidedly acid to delicate litmus paper, which re-action is not altered by boiling. It is unaffected by acids, with the exception of nitric acid, which occasions after a time a very slight precipitate. Corrosive sublimate gives a similar result. The ordinary tests discover the presence of salts of lime and magnesia, sulphuric and phosphoric acids, potash and soda, in variable quantities. A large addition of alcohol throws down flocks of a substance resembling

gum or dextrine, and, lastly, a few drops of sulphate of copper and an excess of caustic potash occasion on heating a very abundant red precipitate of suboxide of copper, the well known mark of the presence of glucose or grape sugar.

When lime-water is added in slight excess to cane-juice a copious precipitate falls, which consists of an azotized organic substance in combination with lime, waxy or fatty matter, and the phosphates of lime and magnesia, the latter constituting more than a fourth part of the dried mass. A similar precipitate is caused by potash and ammonia. The juice therefore appears to contain the following substances, cane-sugar in great quantity; a notable amount of glucose, or sugar of fruits; gum or dextrine; phosphates of lime and magnesia retained in solution; some other salt of lime and magnesia; sulphates and chlorides; potash and soda; and, lastly, a peculiar azotized matter belonging to the albuminous family hitherto undescribed, capable of forming an insoluble compound with lime, not coagulable by heat or acids, and readily putrefiable. Of ordinary vegetable albumen there are but indistinct traces, and of caseine or legumine none.

Cane-juice, left to itself a few hours at the ordinary temperature of tropical countries (80° or thereabouts), becomes very turbid, begins to disengage gas, and deposits a copious flocculent precipitate. In this state it is acid to test-paper and offensive to the smell. The boiled juice keeps better, and that which has undergone the lime-defecation may be kept unchanged for twenty or twenty-four hours, after which period it also becomes turbid and spoils.

When lime-water is added to fresh and heated juice until reddened litmus paper shows the slightest possible trace of alkalinity, the whole heated to the boiling-point, and after standing a few minutes placed upon a paper or cloth filter, a perfectly clear pale yellow liquid runs through, leaving on the filter a greenish grey mass, having the composition already mentioned — namely, consisting chiefly of azotized organic matter combined with lime, and the phosphates of lime and magnesia. The filtration is particularly rapid and easy. The clear liquid evaporated to a syrupy state over the open fire throws up no scum whatever, and colours but little; in this condition, exposed to spontaneous evaporation in a shallow vessel, it furnishes a mass of crystallized sugar, sometimes perfectly dry, and sometimes accompanied by more or less yellow uncrystallizable syrup, in which the presence of common salt in large quantity can be recognized, this body having, as is well known, the power of forming with cane-sugar a highly soluble and deliquescent compound. Even when the whole crystallizes, however, and very little common salt can be detected, the resulting sugar absorbs water when exposed to a very damp atmosphere and becomes moist or wet, indicating the presence of some second deliquescent material in the juice.

The statement, therefore, that good cane-juice contains no saccharine matter but crystallizable sugar, and that the production of molasses or uncrystallizable syrup is wholly due to the excessive heat employed in the common process, must be received with some reservation. No doubt crystallizable sugar to a great extent is destroyed in the boiling, and especially in the last pan, where the boiling point of the liquid rises to 235° or 240° or even higher, and that the result of such mismanagement is a very great increase in the proportion of uncrystallizable mother liquor ; but the whole is not so produced. Unless, therefore, means could be devised for removing the deliquescent compounds which pre-exist to a greater or less extent in the juice, the production of molasses could never be entirely suppressed, although it might be very greatly diminished in amount, and the quantity of crystallized sugar increased in the same proportion, its colour and quality being at the same time so far improved as to enable it to compete for many purposes with refined sugar.

The imperfections of the common method of manufacture in use may now be noticed, and remedies suggested.

In the first place, the crushing-mills are imperfect and do not express the whole of the juice separable by such means. The spongy substance of the cane, retaining liquid with great obstinacy, requires a very good and careful adjustment of the rollers, and the means of regulating the rapidity of motion, to yield the maximum of juice, and these conditions are very far from being fulfilled by the powerful although rude windmills of Barbados. The result is, that instead of a quantity of juice making up 70 or 75 per cent. of the weight of the canes, the quantity yielded by mills of better construction, that obtained rarely exceeds 50 per cent. and sometimes falls below it. The total quantity probably amounts to 85 or 90 per cent., the whole of which of course cannot be obtained by any degree of pressure however powerful. Every endeavour, however, should be made to approximate to this point as nearly as possible. A loss of 20 or 30 per cent. of juice involves a loss of 20 or 30 per cent. of sugar. It will be wise economy, therefore, to spare no expense in providing a mill sufficiently perfect and powerful to do its duty. The power to be applied must depend upon circumstances, and will become a simple question of economy ; provided it be sufficient and capable of regulation its nature matters little.

The common defecation-process, in careful hands, seems susceptible of little improvement. Many other substances than lime have been proposed and tried with more or less success,* some of

* See Dr. Evans's *Sugar Planter's Manual*, a most valuable work, which should be in the hands of every one engaged with, or interested in, the manufacture of sugar.

which, in particular states of the cane-juice, may prove very useful; but for general purposes nothing seems to answer so well as neutralization by lime, either in the form of lime-water or milk of lime, added until the slightest possible tendency to alkalinity, as ascertained by delicate reddened litmus-paper, is perceived. The juice should be somewhat heated before the lime is added, and afterwards raised quite to its boiling-point. The fire is then to be withdrawn, and the whole allowed to rest a short time.

The next step is an innovation. It consists in filtering the juice before evaporation, with a view of removing the whole of the insoluble feculent matter. This may be done with the greatest ease. The cloth-filters employed by sugar-refiners, or in small works, a basket or perforated metal cullender, covered with a linen or woollen cloth, would suffice. A charcoal filter would no doubt be very efficacious, but more expensive and troublesome in use, and mechanical filtration only is really needed. The defecated cane-liquor would thus be obtained perfectly clear, which is never now the case, and on concentration would yield no scum: the labour of skimming and the loss of juice so carried away would be avoided. The feculent matter on the filter might either be employed as ferment in the rum-distillery, or more advantageously transferred to the compost-heap as a most valuable manure. The progress of civilization and morals will probably bring about a diminished demand for rum, which already in many cases is only made for the purpose of employing materials difficult to dispose of, or which would otherwise be wasted, namely, molasses and the skimmings of the coppers. By improved methods of manufacture, however, the molasses might be diminished to an insignificant quantity, which might find a ready market, or be advantageously used upon the estate in feeding stock, now so grievously neglected, while the increased yield of sugar of superior quality, for which the demand at home might become almost indefinite, being only limited by the price, would amply remunerate the enterprising grower.

The filtered liquor must now be concentrated to syrup, which may be done over the open fire, or by steam of moderate pressure circulating in a spiral of copper pipe laid at the bottom of the evaporating vessel, which should be large and shallow, and as unlike as possible the tea cup shaped coppers now in use. Here it may be boiled down rapidly until the temperature of ebullition rises to 225° or thereabouts, without injury to the syrup. When cold, it will then have a density of 1.33, or near it, and mark the 38th degree of Baumé's hydrometer. Beyond this point it will not be safe to go. The concentration of the syrup to the crystallizing point must be completed either by the vacuum-pan—the most perfect of all means, or by one of the several substitutes for

that invaluable invention, of which an account will be found in Dr. Evans's *Manual*, and in other works on the subject. Among these, Gadesden's apparatus may be mentioned as having been used with some success on an estate near Bridgetown, the difference in colour and grain of the sugar made by this machine and that made by the old process over the open fire, at the same time and from the same canes, being quite extraordinary. The chief difficulty attending the use of the vacuum-pan in Barbados will probably arise from deficiency of water for condensation; by sinking wells, however, with the precautions required by the peculiar geological structure of the island, this may be overcome.

The old-fashioned flat shallow crystallizing vessels are exceedingly defective, inasmuch as they permit the too rapid cooling of the syrup, and thus hinder the formation of bold and distinct crystals essential to a good process. The confusedly crystalline pasty mass obtained drains with difficulty, and holds back the last portions of molasses with great obstinacy. This should be by all means avoided, a regular and distinct crystallization should be encouraged by collecting the concentrated syrup in deeper vessels, avoiding too much agitation, and allowing it to remain a longer time than usual before transferring it to the curing-house, where it should be thoroughly and completely drained. Under the present system, the loss of molasses and sugar, the result of hasty and imperfect curing, is almost incredible. During the passage home, the leakage from the hogsheads into the hold of the ship is enormous; the bilge-pumps throw molasses almost as pure as that from the cistern of the sugar-boiler, and this it must be remembered is not simply an uncrystallizable mother-liquor containing the impurities of the cane-juice, but a syrup yet rich in crystallizable sugar. It is quite distressing to witness such culpable waste of that which has become one of the first necessaries of life, through the haste and carelessness of those who would reap the earliest and largest benefit from a better system of management. The fact is, that sugar should be sent home so dry, that it might be put in bags. It is already so with much of the foreign sugar now imported. Stove-drying might even be tried with advantage. At any rate, the present lamentable and wilful waste of property must be by some means or other avoided.

Again, the molasses-cistern of an ordinary sugar-house has been with truth described as a receptacle for dirt and vermin. Sufficient attention is not paid to the preservation of that which has been collected; much of it is wasted and lost in various ways; the remainder being converted into rum, which, in many cases, from its inferior quality, cannot be exported, but gets consumed in the colony, being sold at a very low price to the working population, to which it becomes one of the most powerful and fertile sources of demoralization and ruin. This is notoriously the case in

Barbados, where the licensed dram-shops for the sale of this fiery poison exceed in number six hundred. The preferable method would be to collect it with care in puncheons as it flows from the sugar in the curing-house, and in this manner preserve it until after crop-time, that is, until the leisure time of the year, when it might be advantageously re-boiled in the vacuum pan, and an additional quantity of sugar extracted.

To recapitulate : the attention of the intelligent and enterprising planter should be directed to the following points :—

1. To obtain by the use of a properly constructed mill, the greatest possible amount of juice from the cane.

2. To clarify and filter this juice with expedition, and to evaporate it rapidly either over the open fire, or by steam-heat, as far as it can be done with safety.

3. To complete the concentration in a vacuum-pan, or by other means, at a moderate temperature, not hurtful to the sugar, and to facilitate the natural process of crystallization, so as to obtain a sugar of large and distinct grain.

4. To drain and dry the sugar perfectly, and to save all the molasses.

If the sugar be desired *white*, it can easily be obtained in this condition, by filtering through a bed of animal charcoal the thin syrup ready for the vacuum-pan, according to the practice of refiners, and by afterwards washing the crystals when thoroughly drained, with white syrup. In this manner, raw sugar will be obtained almost equal in colour and purity to refined sugar, but at an increased expense, as the charcoal soon loses its decolourizing power, and requires re-burning, and the washing process consumes a considerable quantity of pure sugar. The propriety of adopting these additional measures will depend entirely on the price such whitened sugar bears in the market. At present an additional duty is levied on such ; it is to be hoped, however, that this most injudicious increase, may, on a proper representation of the facts of the case, be remitted.

The most economical and advantageous mode of heating the vessels of a sugar-establishment, would undoubtedly be by the use of steam—a single boiler, or set of boilers, according to the size of the works, furnishing steam to each, exactly as may be required, being shut off in a moment when no longer wanted, and directed elsewhere with equal ease. To heat the vacuum-pan, steam must be used ; power is required to work the air-pump, or to set in motion the wheel, in Gadesden's apparatus. To furnish enough steam to heat, in addition, the defecating and evaporating vessels will not involve a very great increase of boiler-space or consumption of fuel, and will be attended with the very great advantage of permitting the application of the whole of the megass to the soil

as manure. At present, coal cannot be landed at Barbados from England under 30*s.* or 35*s.* per ton; even at this high price its use would be, without doubt, economical. It might probably be obtained much cheaper from Cape Breton in British North America, or from the United States. The extensive exportation of coal from England is a policy so questionable, that diligent search should be made in other available quarters for this invaluable fuel, a scarcity of which may ere very many more years have past, be felt at home.

OBSERVATIONS ON JENNINGS'S SACCHAROMETER.

BY DR. URE, F.R.S.

By the provisions of the Sugar Bill now in force, Parliament directs the Customs to levy the duties on sugars imported at two different rates, according to two different degrees of quality or strength—a pattern standard of white Java sugar being fixed for the higher duty, and all weaker sugar to be charged the lower duty. The fair determination of these respective rates is of great importance to revenue and trade.

It appears that a Dr. H. C. Jennings submitted, about two years ago, to the Board of Customs, an instrument which he called his Saccharometer, being a floating glass hydrometer, quite similar to the ordinary saccharometer employed by distillers and brewers for taking the specific gravities of their worts. Messrs. Brande and Cooper were "desired by the Commissioners of Customs to test the correctness of the instrument in question, which according to Dr. Jennings, is calculated to indicate the quantity of crystallizable and of uncrystallizable sugar contained in the various denominations of raw or unrefined sugars usually imported into this country, it being presumed that all such sugars are essentially mixtures of the two varieties just mentioned, one of which is represented by white sugar-candy, or double-refined sugar, and the other by the purest colonial molasses." Messrs. Brande and Cooper were provided (to use the words of the Report) "with a standard instrument, acknowledged as such both by Dr. Jennings and by the proper officers of the Customs, and they also received, through the hands of the officers of the Customs, samples of molasses and of pure sugar, and of the several denominations of colonial and other raw or unrefined sugars usually occurring in commerce, with the understanding that duplicate samples of these sugars should be retained at the Custom-House as standards of reference, in the event of any necessity arising of repeating our experiments or otherwise verifying our results." Messrs. Brande and Cooper then proceeded to determine the specific gravities of the solutions or syrups obtained by dissolving one pound of each of the other sugars in two pounds of distilled water,

(the Java standard being previously dissolved in like manner), and to ascertain the corresponding indications upon the scale of the saccharometer. Messrs. Brande and Cooper next present the results of their experiments in the table published at page 581 of the preceding number of this Journal, and terminate their report with certain conclusions, which they think themselves justified in drawing from the general results of their experiments.

"That the composition of the different samples of raw sugar, as respects the relative quantities of crystallizable and uncrystallizable sugar which they contain, may be inferred from the specific gravities of their syrups, or solutions in given quantities of water; and that those specific gravities are conveniently shown by Dr. Jennings's saccharometer."

The following documents by gentlemen of unimpeachable truth and accuracy, prove, beyond a doubt, that the British Government and Customs have suffered themselves to be discreditably tricked out of a large sum of the public money and time, by the Jennings's saccharometer—for the said instrument does not and cannot show the quantities of crystallizable and uncrystallizable sugar in different commercial samples. In fact, all sugars when equally dry, afford, in like weights and with like quantities of water, solutions of the same specific gravity.

Report on Jennings's Saccharometer by Mr. Long, the eminent constructor of Saccharometers and Hydrometers, assisted by Mr. Atlee, Experimental Examiner of Beers, Wines and Liqueurs.

"20, *Little Tower Street*, 28*th March*, 1848.

"Having been called upon by Dr. Jennings to make a floating glass saccharometer upon his principle, as submitted to the Board of Customs, for testing the relative strengths of raw sugars, or the relative proportion of crystalline or loaf sugar in each of them; preparatory thereto, I have in conjunction with Mr. Atlee, made the following experiments with one of my most delicate hydrometric saccharometers, such as is made use of by the Excise department, by the brewers, distillers, &c."

Table of the specific gravities of solutions of one pound of the following Sugars, in two pounds of Distilled Water at 60° Fahr., and also of the loss of weight in moisture by drying the Sugars at 212° Fahr.

Names of the Sugars.	Specific gravities of their Solutions.	Loss by weight in Water per cent
1. White Java	1.1462	$1\frac{1}{4}$
2. Brown Java	1.1449	4
3. Havanna	1.1463	$3\frac{3}{4}$
4. West India	1.1463	7
5. White	1.1457	$7\frac{1}{4}$
6. Crystallized Demerara	1.1460	$3\frac{3}{4}$
7. Yellow Brazil	1.1455	$6\frac{3}{4}$
8. Best refined loaf	1.1462	0

"It appears, therefore, that all sorts of raw sugar, when equally dried by a gentle steam-heat, and dissolved in like quantities of pure water, give like indications by the saccharometer.

(Signed) "JOSEPH LONG.
"JOHN ATLEE."

"*P.S.*—The samples of sugar, 1 to 7, were furnished by Messrs. Webster, Simpson, and Scott, the sugar-brokers in Great Tower Street, and were drawn from the bulk in the Docks."

The above report was sent to me with the following letters :

"20, *Little Tower Street*, 28*th March*, 1848.

"Sir,—Herewith I beg to hand you the particulars of experiments made upon raw and refined sugars, by Mr. Long and myself, accompanied by the solutions of the same sugars, marked Nos. 1 to 8, and shall feel obliged by your analysis of them to verify, or otherwise.

(Signed) "JOHN ATLEE."

"*To Dr. Ure*, 24, *Bloomsbury Square*."

"20, *Little Tower Street, City*, 4*th April*, 1848.

"Sir,—Since I had this pleasure on the 28th ultimo, Dr. Jennings, the recipient of the Government's bounty to the extent of £500 for his improved saccharometer for determining the crystallizable properties of raw sugars, called at Mr. Long's, and in the course of conversation, we explained to him the result of our experiments, as handed to you on the above date, the justness of which he could not controvert, and with the monosyllable "if," said—"if such is the fact, then my instrument is of no use after all ;" and expressed himself anxious about Messrs. Brande and Cooper becoming cognizant of such result—as they had received something like £140 for their report ; thereby tacitly confirming the opinion that both Mr. Long and myself had heretofore entertained—that the principle as applied was a perfect fallacy ; and as a further confirmation, I have, in my inquiries at the Custom-house, ascertained that the instrument is a nullity to all intents and purposes.

"I remain, Sir, yours faithfully,
"JOHN ATLEE."

"*To* DR. URE, F.R.S., 24, *Bloomsbury Square*."

In accordance with Mr. Atlee's request, I took the specific gravities of his several saccharine solutions, with a glass globe of 1000 water grains capacity, and a very delicate balance, and found them to be perfectly correct. That all sorts of sugar, however different in strength or quality of colour, afford solutions of equal density, is a fact well known to all skilful sugar-refiners. The following letter, addressed to me by Mr. Fairie, proprietor of the Whitechapel sugar-house, as well as of one at Liverpool, and two in Scotland, who is justly esteemed one of the most experienced, scientific, and successful sugar-refiners in the kingdom, is a decisive document upon this point. "I agree with you entirely, that the scheme of charging duty on sugar by the gravity of a solution, is *altogether absurd*, and that it ought to be exposed. I pledge myself to prove to the Surveyors General" (of the Customs) "that all sugars equally dry and free from dirt, when in solution show an equal gravity."

In assuming the best colonial molasses as the type of uncrystallizable sugar, did Messrs. Brande and Cooper not know that Colonial molasses always containa notable proportion of crystalline sugar, and are worked on account of it in our sugar refineries, where they yield from five to twenty per cent. of the sort of raw sugar called *bastards*, exposed for sale in every grocer's shop in the United Kingdom? Hence the basis of all their experiments being fallacious, their results are not entitled to confidence.

In the month of July, 1845, when the new Sugar Bill and Tariff were about to be introduced, along with the analytical services then being performed by me to the Customs, I proffered *gratuitously*, a ready method of eliminating the whole crystalline grain from any sample of raw sugar, and by weighing the crystals, measuring exactly the proportion of non-crystallizable syrup. I exhibited my experimental method before several of the Surveyors' General, and left my simple apparatus in one of their rooms (Mr. Weston's) but finding that an under-current was working secretly in favour of Dr. Jennings, I withdrew my apparatus.

Early in the month of January last, I presented a confidential memorial to the Right Hon. Sir Thomas Freemantle, Bart., Chairman of the Customs, stating very clearly the above, and some other acts of mal-administration which had come under my professional cognizance in this great department of the public service. This courteously-expressed communication he did not deign to acknowledge. On the 4th of May, I sent a similar memorial to the Right Hon. Sir Charles Wood, Bart., Chancellor of the Exchequer, to which I received an answer next day. The following is an extract from my reply to that letter:—

"I thank you for the honour you have done me, in the prompt acknowledgment of my memorial; whereas one of like import addressed to the Chairman of the Board of Customs has remained unnoticed for upwards of five months. Nor would I again have intruded upon your public functions by my correspondence, had you not, in my humble apprehension, mistaken its main drift. I neither have, nor can have, any concern whatever with the person, alike unknown to me, and to the chemical world, who styles himself Dr. Jennings; but from his pretended saccharometer, I conclude with certainty that he is in the scientific sense of the term, an empirical sciolist—whether consciously or unconsciously I do not presume to decide. Whichever be the truth, the Customs are justified in treating his bauble with contempt, after they have discovered (though somewhat too late) how far he had practised upon their credulity, and after he himself has confessed to Messrs. Long and Atlee that his saccharometer is no test of the strength of sugar.

"I take leave to ask you, Sir, as Chancellor of Her Majesty's Exchequer, and, therefore, in duty as in desire solicitous for the right working of the revenue laws, if it be not most disreputable in the middle of the nineteenth century, under such a blaze of scientific light, that your liberally-paid fiscal officers cannot execute the provisions of your own bill for

levying duties on sugars, according to their degrees of strength? That they are incapable of doing so is manifest from their adoption of a test, which every intelligent sugar-refiner (as Mr. Fairie) and every chemist conversant with sugar knows to be absurd. That £640 of the public money should have been lavished in fees for this notable piece of quackery, besides much more in senseless experiments, &c., by the Surveyors of the Customs would certainly appear incredible, did not the adage of the great Chancellor Oxenstiern, serve to solve the problem.*

"Andrew Ure."

"*To the Right Hon. Sir Charles Wood, Bart.,*
"*Chancellor of Her Majesty's Exchequer.*"

* "You are not aware, my son, with how little knowledge great States are governed."

ON THE MICROSCOPIC VEGETATIONS DEVELOPED IN PHARMACEUTICAL LIQUIDS.

BY JONATHAN PEREIRA, M.D., F.R.S.

Continued from Vol. VII., page 432.

OF YEAST *(continued)*.

6. *Yeast five days after the commencement of fermentation.*—At this period, the fermentation of the saccharine solution had ceased, and the froth, elevated by the disengagement of carbonic acid, sank on the surface of the liquor, whose odour was that of sour paste, and whose taste was like that of the acid of the grey rennette apple which has become heated. The plants *(torulæ)* having exhausted all the nutritive matter of the liquid, died from starvation, became disarticulated, and fell to the bottom of the bottle in the form of new yeast. The vegetables were incomplete since, at the time of their dissociation, they were producing buds.

Origin.—The origin and development of yeast constitute a most interesting object of inquiry.

No one I think can doubt, from the description already given of the yeast globules, that these bodies are microscopic organisms. The changes which they undergo, in other words, their growth, demonstrate that they are living bodies.

A very curious fact in connection with this subject, was mentioned to me by the importer of German and Dutch yeast, in Finch Lane, Cornhill; it is, that mechanical injury kills or destroys yeast. Foreign yeast is imported in bags, and of these great care is requisite in their removal from place to place. If they be allowed to fall violently on the ground the yeast is spoiled. A bruise, as a blow given to the bag, also destroys it. The men who make up the dried yeast into quarter-pound and half-pound balls for sale, are obliged to handle it very dexterously, or they injure and destroy it. In fact, falls, bruises, or rough handling kills it, and the yeast which has thus been mechanically

injured, may be readily distinguished from good, unaltered yeast. Its colour becomes darker, somewhat like the change which an apple or pear undergoes when it becomes rotten; and from being crumbly or powdery, it becomes soft, glutinous, sticky to the fingers like flour-paste, and soon stinks. I have submitted some of this injured or dead yeast to microscopical examination, but have been unable to detect any difference in its appearance from healthy yeast.

It is well known that a pure solution of sugar will not undergo fermentation when exposed to the air, but a saccharine vegetable juice (as the juice of the grape) suffers spontaneous fermentation. What is the reason of this? The vegetable juice contains an albuminous or nitrogenous principle, to which its fermentability is referable.

Whenever fermentation commences in vegetable juices, the process always begins with the formation of yeast globules. What is the origin of these?

By some it is asserted, that yeast-germs are floating in the air, and that meeting with a fit receptacle for their development in the vegetable juice, they here germinate and grow, and effect vinous fermentation.

But it may be objected to this opinion, that these floating, atmospherical yeast-germs, have never been detected or recognised by the microscope, and that their existence is, therefore, altogether assumed. Moreover, we may ask with Kützing, what is the reason that these germs if they really exist, cannot cause fermentation in a pure solution of sugar. These and other reasons, have induced some naturalists to admit a *generatio primitiva*.

Turpin has endeavoured to prove that yeast globules are derived from organic tissues, from whence they are separated under the form of what he calls *globulins*. This separation takes place after the life of association *(la vie d'association)* of these tissues. These globulins are often invisible to the microscope at the moment of their dissociation, as is the case with those of the white of eggs, of the filtered juice of the grape, apple, plum, currants, &c., which appear, only after the lapse of some time, at the surface of the saccharine liquids, under the form of light pellicles, composed of a prodigious number of globulins, of about the $\frac{1}{800}$th of a millimetre, and which, on account of their minute size, possess a very obvious movement *de fourmillement*.

Beer yeast is derived, according to Turpin, from the globulins of the perisperm, or albumen of barley. When a grain of barley is deprived of its hard and scaly envelopes, we find it to consist mainly of the perisperm or albumen, at the base of which is situated the embryo.

Fig. 27.

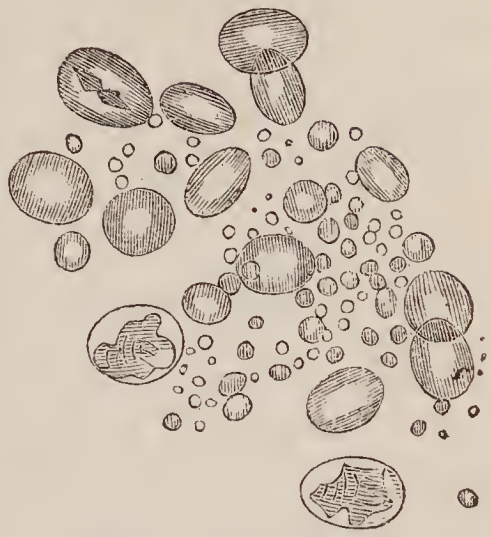
A maternal vesicle of the albumen of barley.

The perisperm or albumen is a mass of cellular tissue, in which resides all the nutritive matter of the grain. It consists of an agglomeration of what Turpin calls *maternal* vesicles (fig. 27) which are colourless and diaphanous, and usually ovoid. They contain a great number of starch grains, or what Turpin terms *globulins*.

When these vesicles are ruptured, the grains of fecula which they contain, escape. These grains (fig. 28) vary considerably in

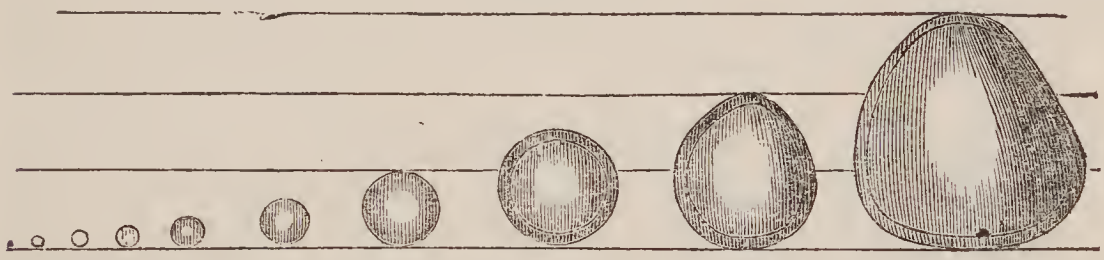
size, from the smallest perceptible point, to about the $\frac{1}{20}$th of a millimetre. At first their shape is spherical, but as they grow, they mutually compress each other in the maternal vesicle, and in this way acquire an ovoid or obtusely triangular form. Their transparency is such, that when two grains overlap, the outline of the one can be seen through the other. Turpin asserts that all these grains are intestinal and microscopic bulbilli, which, under favourable circumstances, germinate and produce the parent plant, or when isolated and contained in a saccharine solution, perform the office of yeast, by germinating or vegetating under the very diminished form of a filamentous mucedo. And he states that the smallest and most numerous of these bulbiferous grains present, under the microscope, an unequivocal movement *de fourmillement*.

Fig. 28.



Grains of barley-starch, or the feculent globulins of Turpin.

Fig. 29.



Micrometer scale, indicating $\frac{3}{100}$ths of a millimetre, and on which is placed a series of grains of globulins or starch, from the smallest to the largest, the latter being, as is obvious, about the $\frac{1}{33}$d of a millimetre.

The source of beer yeast, then, according to Turpin, is the grains of fecula, and perhaps also the numerous globulins which escape when the larger grains are ruptured. He states, in support of this view, that brewers have observed that the more barley is used in the steep, the greater will be the amount of yeast yielded by the beer. "It may be asked," says Turpin, "how it is that the seminuliferous globules of yeast, instead of being destroyed, have multiplied by the ebullition of the wort?" The fact existing, does not require an answer. "But we may say," adds Turpin, "that the little seeds of the fungi are not altered by ebullition, and that being afterwards mixed with water and placed in an appropriate territory, germinate there perfectly and abundantly."

When the wort, composed of water, mucilage, sugar, small globular seeds of yeast, aromatic oil, or bitter principle of the hop and dead globules of the latter, is left to itself, it feebly ferments. There is an indolence of action; the sugar is decomposed slowly, and alcoholization is incompletely effected, and we have a bad beer which quickly becomes sour, because the number of decompositors has not been sufficient. But if to the number of the primitive small seeds of natural yeast found in the wort, we add a certain quantity of others, obtained from

a preceding collection, the fermentation goes on briskly by the aid of these auxiliaries, and good beer is the result.

Such then, is the primitive origin of beer yeast. Its increase is effected in two ways: by the disarticulation of the moniliform stems of yeast, and by the escape of seminuliferous globules from the interior of the vesicular joints.

[*To be continued.*]

ON THE REVALENTA ARABICA.

In the *Pharmaceutical Journal* for March, 1845 (vol. iv., p. 415), we exposed the nature of a secret remedy for constipation, called *Ervalenta* and *Melasse de la Cochin China.* The first (the ervalenta) we explained was the meal of the lentil called *Ervum Lens*, sold at three times its ordinary price; and the second (the melasse de la Cochin China), was common treacle, sold at five times the usual charge for it; and the smallest quantity of these two sold cost twenty-eight shillings.

The speculation has, we presume, proved a lucrative one, for it has given rise to an imitation in the form of a preparation, called "*Revalenta Arabica*," a nutritive and eminently curative fecula, derived from an African plant." It is prepared like gruel, by mixing two ounces of it with a pint-and-a-half or a quart of water, boiling over a slow fire, and stirring well till it has boiled for fifteen minutes. Honey, or the best raw sugar, and salt to taste, are then added, and it is ready for use. If this does not act sufficiently on the bowels, two or three spoonfuls of "our prepared melasse" are to be substituted for the raw sugar.

The word "*Revalenta*" is obviously borrowed from "*Ervalenta*," by the transposition of the letters of the first syllable.

The word "*Ervalenta*" is derived, as we before explained, from the "*Ervum Lens*," the botanical name of the lentil.

The lentil is cultivated in Egypt, as well as in various parts of Europe, and, therefore, the proprietor of the *revalenta* is so far correct when he says it is an "African plant."

On subjecting the meal called *revalenta* to a microscopic examination, we find that, like *ervalenta*, it is prepared from the lentil. The character of the starch-grain readily distinguishes it.

SANITARY QUESTIONS, OBSERVATIONS, AND SUGGESTIONS ON THE WOLVERTON WELL-WATER, AS SUPPLIED TO THE INHABITANTS.

BY GEORGE CORFE, ESQ.
Resident Medical Officer at the Middlesex Hospital.

Soon after the opening of the Railway line from London to Birmingham in 1838, it was considered, by the Directors, that Wolverton, a mere farm-house, fifty-two miles from London, or just halfway between these

two towns, should form a station for supplying the locomotives with water, and that a factory should also be established there. The latter has been accomplished, and now the little town averages 1400 to 1600 inhabitants. There are a church, two public-houses, and various shops, so that it has become a place of some importance in every respect.

In order to accomplish the former object, the locomotives were supplied from the canal adjoining the station. The water was forced up by pumps into a tank, and from thence conveyed to the engines when required. But the exorbitant demands which the Canal Company made for such supply, induced the directors of the Railway Company to sink a well in the centre of the factory then erecting. This was in 1840. Accordingly, a well fifteen fathoms deep was sunk, and the water was brought up by an engine to another and larger tank, erected by the side of the former one, but capable of communicating by a main pipe; so that in the event of any deficiency from one source, there might be a supply from the other. As soon as the well, tank, &c., were complete, the engines were wholly supplied by this water; but in the course of a few weeks after its use, the drivers found that they experienced great difficulty in getting the steam up; the water required more fuel, the trains were after time, the boilers and the machinery were much furred and clogged, and the foam or scum on the surface of the boiling liquid was such, that after several failures and disappointments, they were reluctantly compelled to abandon the use of the well-water, and once more return to their supply from the canal.

The houses were now rapidly increasing, and the next question seems to have been, how these dwellings should be furnished with water. The pipes were laid on to the houses, from the well-tank in three or four streets, whilst, in some others, pipes from both tanks were supplied.

It appears, therefore, in the history of this spot, that about the year 1841, the inhabitants were supplied wholly by well-water, and the locomotives by canal water. But it was soon observed that the use of the former beverage gave rise to a singular but unequivocal train of symptoms of derangement in the stomach, bowels, &c. The directors at length were satisfied that the well-water was not only unfit for their engines, but that it was not altogether a wholesome beverage. But then the difficulty arose how these inhabitants should be furnished with a different water. The houses subsequently built were accordingly supplied with "half-and-half," or partly well and partly canal-water.

Notwithstanding this arrangement, there was a constant complaint, especially by the new comers, that the water disagreed with them: and the men broke out in eruptions over the face, hands, and neck, and the women and children were the subjects of a much more distressing train of symptoms.

From the year 1841 to the autumn of 1847, a large number of cases were attended by the medical gentlemen of Newport Pagnel, Stoney Stratford, and the practitioner at the station, yet the Company were then in the habit of sending cases occasionally to the Assistant Physician of this hospital; but it appears that about the autumn and winter months of 1847 and 1848, the water, especially of the well, became unusually thick, yellowish, and loaded with extraneous vegetable matter.

Since the 1st of January of the present year, 110 out-patients have been sent to Middlesex Hospital from Wolverton, exclusive of surgical cases. There has also been a large mortality from pulmonary complaints at the station, the patients, chiefly children, having been attended by the resident medical practitioner.

A large proportion of the out-patients above-mentioned came under my charge as the resident medical officer, on account of their arrival at irregular hours, and I was struck with the uniformity of their symptoms.

Of these 120 cases of which I have carefully preserved an abstract or outline of the diseases, &c., there were thirty-seven males and seventy-three females. Of these males, eighteen were under the age of twelve years, and the remainder were boys or men employed in the factory. Of the females, there were also eighteen under the age of twelve, and the remainder were married women with families, except in two or three instances.

But in order to present the subject in its most important and interesting view, I am desirous of classifying the whole number under two distinct heads, viz., those who partook of the well water *exclusively*, and those who were supplied by the mixed, or canal and well water, and the striking difference in the character of the respective diseases will be apparent.

There were sixty-one cases (as the sixty-second patient lived at Stoney-Stratford, and walked to his work daily at the station) who were sufferers from the injurious effects of the well-water, and forty-nine of the mixed water.

My register of the cases specifies the sex, name, age, locality in Wolverton, the period of residence at the station, the state of health before such residence, the towns from whence they came, and the date of their illness, its rise, progress, and their present symptoms, together with the observation of any peculiar features in the disease, and its termination, &c.

The diseases may be divided into two classes. The first class were chiefly amongst the young men, boys, and children, and soon after their arrival in the town they presented the following symptoms: scaly or desquamating surface of the face and neck, porrigo of the head, or psoriasis of the neck, hands, and arms, or urticaria. Febrile excitement, with more or less disturbance in the bowels, loss of appetite, cough, and disturbed sleep.

Amongst the second class of sufferers from this water, there were the following more serious, distressing, and intractable symptoms:—constant frontal headache, muscæ volitantes, dizziness of sight, temporary loss of consciousness, impaired memory, recurring three or four times a day, excessive prostration of the mental and bodily powers, palpitation, pulse varying from 100 to 120, sometimes intermittent, skin feverish, tongue clammy and furred, bowels costive, and constant gastralgia, with tenderness on pressure. No appetite, disturbed sleep from frightful dreams, a dry, harsh, and straining cough. The cerebral symptoms in some instances, were attended with distinct epileptic fits, especially in one lad of seventeen, who was seized with nine successive attacks in one day; but it is important to notice here that the lad lost the attacks of giddiness, &c., when his uncle, who lives a mile from Wolverton, allowed him to lodge with him, and he walked to the station to his work, but never took his meals there. He

expressed himself as not feeling like the same, since he resided at the house of his relation. They all complained more or less of a peculiar coppery or foul taste upon the tongue in the morning, and of the total loss of appetite for breakfast.

Although I have divided the class of patients under two heads, for the sake of drawing a line between the two characters of disease with which they were affected, yet, in reality, the sufferers from the mixed water presented the same train of obstinate and severe complaints as did those from the well-water, with this difference, that the symptoms in the latter class of patients were more obstinate, more decided, and were never accompanied with the presence of entozoa. Whilst in many of the cases from the canal-water, there were unequivocal evidences of the existence of *tænia lata*, *ascaris*, and *ascaris lumbricoides*, and after they had been expelled by the usual anthelmintics, as turpentine, pomegranate root, &c., and steel, the symptoms corresponded with those of the patients who partook wholly of the well-water.

In consequence of observing that all these patients exhibited much uniformity in their symptoms, I was induced to note them down, and at length I waited upon Mr. Creed, the Secretary to the Company, at Euston Station, and informed him of my suspicions. This gentleman, after thanking me for the great trouble I had taken in investigating the subject, requested me to have an interview with Mr. Dockray, the superintendent engineer. I acceded, and found that he was not altogether a stranger to the suspicious character of the water, but he was under the impression that it merely affected new comers; and that its evil effects soon wore away as the people became accustomed to it, and were able to bear it. In this latter opinion I corrected him, inasmuch as I pointed out the fact that there was a larger number of cases now than had occurred for a long time. However, he was most anxious to obtain all the information possible, and enquired what I would suggest. I proposed that the two waters should be analyzed by our Professor of Chemistry, Dr. Ronalds, and I left him twenty-four questions, to which he promised to forward replies of undoubted accuracy.

The waters were sent, and the analysis was made, and my questions were faithfully answered, when the following valuable facts came to light. The well-water was proved to be a weak saline and alkaline spring, and the canal-water a tolerably pure soft water.

Here, however, I must digress a little in order to return to the subject of the diseases. Until my suspicions were raised that this water was saline and alkaline in its character, I had treated the majority of cases with hydrochlorate of ammonia in some bitter infusion, with an occasional aperient of compound decoction of aloes, or aloetic pills, and by using either the ointment of creosote, the weak nitric oxide of mercury, or chalk, to some of the severe cases of eruptive diseases, but in nearly all the instances, it proved unavailing. When, however, the valuable chemical discovery was made that the well-water was a simple alkaline spring, I immediately commenced a totally opposite treatment. The nitro-hydrochloric acid, with or without steel, in some bitter infusion, was now substituted. The eruptive diseases were treated by weak nitric acid lotions, the patients were strictly enjoined not to use the well-water for culinary purposes, and the improvement in their health was very marked and decided, except in two or three instances, where,

I afterwards found, I had neglected to warn them not to use the water for the purposes of cooking their meals. But even in these few instances, they made more progress when it was left off than before.

So singular and so uniform were the symptoms of the whole class of patients, that I do not exceed the bounds of truth when I assert, that if a patient presented herself, and informed me of the street she lived in, I could repeat her ailments almost word for word before I interrogated her. If she was from Ledsom or Creed Streets, she would labour under the distressing cerebral symptoms already alluded to, with palpitation, hurried pulse, feverish skin, and total prostration of physical and mental energies. If she resided in Walker, Bury, or Cook Streets, or the North Cottages, I might find, in addition to the above symptoms, unequivocal evidences of tænia or lumbrici, whilst, if they were children, the presence of ringworm, psoriasis, and ascarides, were more or less observed. One instance I cannot refrain from alluding to, it was that of a boy eleven years of age, who, with his mother, became patients in the early part of January. They had resided in Bury-street, and had therefore been supplied with the mixed water ; they were natives of Stoney Stratford, two miles distant from the station, and had been in Wolverton eighteen months. The mother was seized in October, 1847, with vertigo, frontal headache, loss of appetite, palpitation, alternate flushings, and clammy perspirations ; and the boy, in November, was attacked with blindness and double strabismus, with constant weight over the forehead. They had both been under medical treatment for some time in Wolverton without avail, and observing the equivocal nature of nervous symptoms in many of these poor people, I was led to conclude that the squint and headache arose from mere cerebral distress rather than cerebral dis ease. He was ordered an emetic twice a week, and a dose of turpentine and castor-oil to be given on the morning succeeding the emetic. When he had pursued this plan for a fortnight, the mother and myself were gratified to find that the boy's sight returned, the strabismus diminished, and his health improved; but it was co-existent with the escape of a large number of joints of a tænia lata, and numerous ascarides. He was discharged quite well before the end of January, and the mother has greatly improved also under the use of steel wine in a bitter infusion. A man is now in attendance upon Mr. C. De Morgan, who has charge of the Ophthalmic department, with partial loss of sight in the left eye, and impaired vision in the right, attended with muscæ volitantes. He is a native of Leeds, and had resided in Ledsom Street, Wolverton (well-water), for ten months. This attack crept on after he had been there four months : he is greatly improving.

I will now pass on to the interesting but important facts communicated to me by R. B. Dockray, Esq., and Dr. Ronalds. The nature of the earth about Wolverton, for the first fifteen to twenty feet, is a mixture of limestone and white marl, and below that depth it is a blue greasy clay. This clay I have a specimen of, as it was taken from the well, and its consistence, appearance, and chemical qualities, exactly correspond to that of "fuller's earth," so common in the county of Bucks, that is to say, silica, alumina, magnesia, lime, chloride of sodium, with traces of potash and oxide of iron. It will be seen presently that these elements enter largely into the saline ingredients

of the well-water. It is forced by a stationary engine into a large cistern in the roof of the factory, and supplies the schools, Creed, Ledsom, and Young Streets, and Glyn Square. The mains are cast iron, whilst the services are partly lead and partly iron pipes.

The locomotives are supplied by the canal, which is also worked into a large cistern on the top of the factory, some distance from the well-cistern, but it is connected with it by a cast-iron main and stop-cock. The inhabitants of the North Cottages, Bury and Gas Streets, have a mixed supply of well and canal-water. But these supplies are far inferior in quality to the clear and pleasant springs existing at a public-house, "The Engineer,"* and the Parsonage House, near the Station. The drainage is excellent, and no suspicion of poison can arise from any imperfection in this department; indeed, the whole train of symptoms in all the cases does not favour the supposition of an animal malaria.

I shall now proceed to the respective analyses of the well and canal-water qualitatively, by which the character of this saline alkaline spring will be at once observed.

	Specific gravity.	Degree of Hardness by Clark's Test.	Total amount of Solid Matter per gallon in grains.	Organic Matter per gallon in grains.	Saline Matter per gallon in grains.		Nature of the Saline Matter.
					Soluble after Evaporation.	Insoluble after Evaporation.	
No. 1. Water from Canal at Wolverton.	1.00025	13°	20.1	2.8	3.72	13.58	Carbonate of Lime with a trace of Magnesia. Oxide of Iron and Alumina in small quantity. Sulphates of Soda and Potash. Chlorides of Sodium and Potassium in small quantity. Silica.

This water is of a dirty yellow colour, is distinctly alkaline to test paper, it contains chiefly bi-carbonate of lime in solution, and rather more organic matter than should exist in water for drinking.

No. 2. Water from Well at Wolverton.	1.0005	13°	42.78	2.34	26.78	13.66	Free Carbonic Acid. Carbonate of Lime with a trace of Magnesia. Sulphate of Soda in large quantities. Sulphate of Potash. Chloride of Sodium in large quantity. Chloride of Potassium. Carbonates of Potash and Soda. Silica. Oxide of Iron and Alumina in small quantity.

This water is remarkable for the large quantity of alkaline carbonates, sulphates, and chlorides which it contains, and which render it a weak saline water.

* It will be seen by analysis of these two waters, that neither of them are suited for drinking, and that the spring in the Parsonage House is the only one of the two that can be considered to approach to a wholesome beverage.

In addition to this analysis it should be observed that the temperature of the canal is 46°, whilst that of the well is 53°.

I have here subjoined a subsequent analysis made by Dr. Ronalds, of five springs on the station.

The character of the water from the Refreshment Room was any thing but "refreshing" either in look or in taste; it was opalescent, and had a vapid, brackish flavour, which was not observed in the other specimens. The Blue Bridge and Parsonage House waters were very pleasant to drink, and were sparkling in character.

QUALITATIVE ANALYSIS OF SPECIMENS OF WATER FROM FIVE SPRINGS IN AND AROUND WOLVERTON STATION.

No. of Specimen	Specific gravity.	Hardness by Soap Test.*	Saline Matter per gallon	Organic Matter per gallon	Total Solid Matter per gallon	Nature of Saline Matter.
1	1.00079	37°.95	53.8	26.6	80.4	Chlorides of Sodium and Potassium, Sulphates of Soda and Potash, Sulphates and Carbonates of Lime, Silica, Alumina, and Oxide of Iron.
2	1.00049	24°. 9	29.7	3.1	32.8	The same as No. 1.
3	1.00059	26°. 2	35.2	5.4	40.6	The same as No. 1, but no Alumina or Sulphate of Lime.
4	1.00066	32°. 4	54.5	Traces	54.5	The same as No. 1, with the addition of Carbonate of Magnesia, but no Sulphate of Lime.
5	1.00058	31°. 5	43.4	Traces	43.4	The same as No. 4.

No. 1.—Water from the Well in the Refreshment Room.
No. 2.—Water from the Blue Bridge Cutting, 1½-mile from the station.
No. 3.—Water from the Well at the Parsonage House.
No. 4.—Water from the Well at the Royal Engineer Inn.
No. 5.—Water from the Well at the Radcliffe Arms' Inn.

PROPERTIES OF INDIAN HEMP.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—We have just now read a communication of M. F. Foy in the *Journal de Pharmacie* for May last, casting doubt on the remarkably striking narcotic properties of Indian Hemp. Calling to mind the numerous experiments instituted by ourselves, and first published in your Journal,† in which its qualities were tried on our own frames and those of others, and this so frequently that not the shadow of a doubt as to its potency could reasonably remain, and that indeed its peculiar narcotic virtue was really wonderful, and not less marked than even opium itself, we could not but feel very much surprised that the promulgation of a counter doctrine should receive countenance from the conductors of so eminent a periodical as the *Journal de Pharmacie*, more especially as a copy of our memoirs reached the conductors of that Journal, and as an abstract was published in its

* Each degree of hardness corresponds to one grain of carbonate of lime per gallon.

† *Vide Pharmaceutical Journal*, vol. iv, pages 127 and 171.

columns. In detailing these experiments and conclusions regarding the principle of Indian Hemp, we distinctly stated and proved, that the *whole* of its activity resided in a peculiar neutral resin, and that that resin required strong rectified spirit for its solution; and that, on adding water to that solution in a gradual way, the resin must be of necessity separated long before the strength of the spirit is brought down to proof. The only explanation required to account for the failure of M. Foy, as well as others coinciding with him in opinion, is to be found in this fact proved by us, that in reality the essential principle of the medicine had never been administered by them. The active resin must have been left behind untouched, by the solvents to which the drug was subjected, or the plant used, instead of genuine Gunjah or Indian Hemp, must have been another plant altogether.

M. Foy thinks that where a narcotic action may have arisen, the famous Hashisch had no concern in the results, the vehicle of its administration having been in these cases the only active agent. A little reflection would possibly satisfy even M. Foy himself, that this supposition cannot be a sound one, considering that the alcoholic solvent has not been used in all cases, and where used, has been in perfectly insignificant quantities. Indeed, the sole fact necessary to disprove such an erroneous idea is, that the full effects have been repeatedly obtained by its employment in the form of pills, made with the resin entirely unmixed with any other substance.

We may in conclusion say, that setting aside all that has been observed and done by ourselves and others on this drug, if M. Foy, in the paper in question is to be held to have advanced true doctrine, oriental nations must for ages have been labouring under a strange delusion regarding the marvellous nature of Indian Hemp—a delusion in fact quite incomprehensible.

T. & H. Smith.

21, *Duke Street, Edinburgh, 16th June*, 1848.

TINCTURA OPII.

BY MR. HARVEY.

Most Chemists suffer inconvenience and loss in recovering tinctures from the dregs, whether they proceed by digestion or displacement, and the loss is proportionably greater as the quantities operated on are smaller. I venture to submit a method of preparing one of the most important tinctures, by which a product of full quantity and uniform strength may be obtained, or in other words, by which all waste, whether of opium or spirit, are entirely obviated. The same process is applicable to various other tinctures, when the quantity to be operated on is not large. For large quantities, it would require some modification, with a view to save time.

Proportions.—Opium, in its ordinary commercial state, thirty ounces avoirdupois (equal to twenty-four ounces hard opium, apothecaries' weight). Rectified spirit, ten pints. Water q. s.

Process.—It must be presumed the operator has at hand two gallons of the tincture prepared by digestion, and ready to be strained off, and also a displacement apparatus, consisting of a glass or tin cylinder, open at both ends, with an external rim near the middle, to support it over the receiver, which is simply a large specie jar, with a wooden shelf or cover perforated to receive the cylinder or percolator. Having tied a piece of calico round one end of the percolator, pour into it the tincture, and allow the latter to filter through its own dregs till it has ceased to drop. Then cautiously pour water upon the dregs until sufficient liquid has passed through to make up the tincture to the full quantity of two gallons.

Then proceed for the next lot. Pour more water upon the dregs in the percolator until three pints, and then three pints more, have passed through. Add the first three pints to ten pints of rectified spirit, and with the second three pints macerate the opium (previously sliced) by the aid of a gentle heat and occasional stirring, until reduced to a soft pulp. Mix this with the other thirteen pints of the menstruum, and set aside till wanted, shaking it at intervals.

Dr. Christison states, that a fluid ounce of good tincture of opium, when thoroughly dried up in the water-bath, should leave from seventeen to twenty-two grains of residuum. A fluid-ounce of a tincture recently prepared by the above process, yielded twenty-one grains. The *marc* when dried, weighed seven-and-a-half ounces avoirdupois, and had no property of opium sensible to the smell or taste.

Leeds, June 19, 1848.

ISOTHERMAL BATH AND OVEN.

BY C. B. MANSFIELD, ESQ.

THERE are many processes in the arts in which a uniform temperature is required to be maintained for a considerable time; some of these operations demand great heats, while the presence of mechanical force is not only useless, but inconvenient, or even highly dangerous.

Chemical baths for certain temperatures are as old as the sea; *e. g.*, for those at which water and saturated solutions of certain salts boil; and for those at which fixed oils decompose rapidly; but these give us but few points of the scale; saline solutions have many inconveniences in practice, and the heat of oil-baths is very indefinite. High-pressure steam affords the means of commanding the required conditions approximately in some cases, but involves of necessity the non-requisite conversion of heat into explosive power.

A method is here offered, which will be found to present the desired conditions—the means of maintaining a bath or oven constantly at any required temperature, from about 160° Fahr., up nearly to the boiling point of mercury—without the production of half a mouse power of disruptive energy. It is simple and inexpensive.

It is not necessary that we should discover fluids having boiling points at

every degree of the thermometric scale. The purpose is served by any mixture of two or more liquids soluble in each other, the boiling-point of one of which lies below, and that of another above the heat required. If such a fluid is set on the fire in an open vessel or in a retort, it will begin to boil at a temperature somewhere above the boiling point of the most volatile substance it contains; and the temperature will gradually rise as the more easily vaporised part goes off, and this proceeds till the temperature reaches more or less nearly the boiling point of the least volatile matter present in the mixture. If, however, at any period of the operation, the vapours are prevented from escaping, by condensation—not by physical force pressure, but by the gentle persuasion of cold—and as they rise, are continually returned to the boiler in the fluid state, it is clear that the heat of the mixed liquid (which is under unalterable orders from the Great Constructive Chemist, not to rise above any given temperature, under given pressures, till it has expelled from within it so much of it as is volatile under those conditions,) will cease to increase; and that, therefore, so long as the *vis a tergo* of the fire keeps it up to the mark, the temperature must remain constant.

Now we are provided in very reasonable abundance with such fluids. Mixtures of pyroxylic spirit or alcohol with water, will begin to boil at various temperatures, according to the proportions of spirit to water. Pyroxylic spirit, which will begin to boil at 160° Fahr., may be purchased at five shillings or six shillings per gallon: and, alas! for an excise, which has been almost prohibiting Chemists from using alcohol in their laboratories, and permits a half-fed population of paupers to thin itself off with pennyworths of poison—gin is not very dear. Either of these spirits or mixtures of them with water, will commence to boil at some temperature below 212° Fahr. By heating such a fluid in a vessel, the principle of which will be described below, it may be kept boiling at the temperature at which it commences; or, by allowing the vapour to escape, and the temperature to rise, till it has reached any required point above that of first ebullition, and by then condensing and returning the vapour to the vessel in the fluid state, the heat may be maintained constantly at any point between that at which the mixture commenced to boil, and 212° Fahr. For higher temperatures, we are supplied with regulators by many mixtures of volatile hydro-carbons, such as native naphtha, the oils of wood-tar, &c.; but especially by the oils distilled from coal-tar, which enable us to command any point from 180° Fahr. up to 550° Fahr. If any temperature between the boiling point of water and 400° Fahr. is required, all that is necessary, is to take a convenient quantity of light coal naphtha, to distil it with a thermometer in the retort till the temperature has reached the point sought, then to stop the operation, and to use the residue as the regulating fluid. The light coal naphtha usually begins to boil at about 200°, and the temperature rises to about 300° or 400° before all has boiled away, according as the naphtha is rectified or crude. The rectified material is sold at about two shillings and sixpence, or three shillings per gallon, and the crude at about one shilling and sixpence. Temperatures between 180° and 220° Fahr., may be commanded by the use of the very volatile oil (*benzole*) which may be obtained from the naphtha by receiving separately the portions first distilled from it. For temperatures between 350° or 400°, and 550° Fahr., the heavy oil of coal tar, which comes over after the light naphtha has been worked off, is an excellent regulator; it commences usually to boil at about 300° and the temperature rises up to 550° before all has evaporated. This "dead oil" may be purchased at threepence or sixpence per gallon. Heats higher than these—above the boiling point of mercury—may be maintained by charging the apparatus with some of the substances, even less volatile,

which are obtained by distilling the pitch which remains when the heavy naphtha has been drawn off; but these are more difficult of management, and require thermometers not dependent on the expansion of mercury.

The accompanying figures represent the principle of the apparatus. Fig. 1 represents an arrangement for keeping a horizontal cylindrical oven at a uniform temperature; and fig. 2, a pot or bath, fitted with similar appliances. A is the chamber or vessel required to be heated; B, the bath, or still-boiler, through which heat is conveyed from the fire, C, to A; B is

Fig. 1.

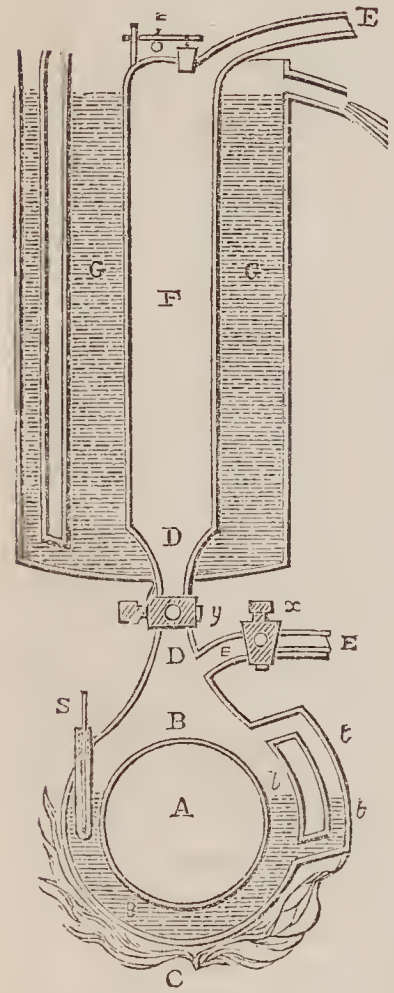


Fig. 2.

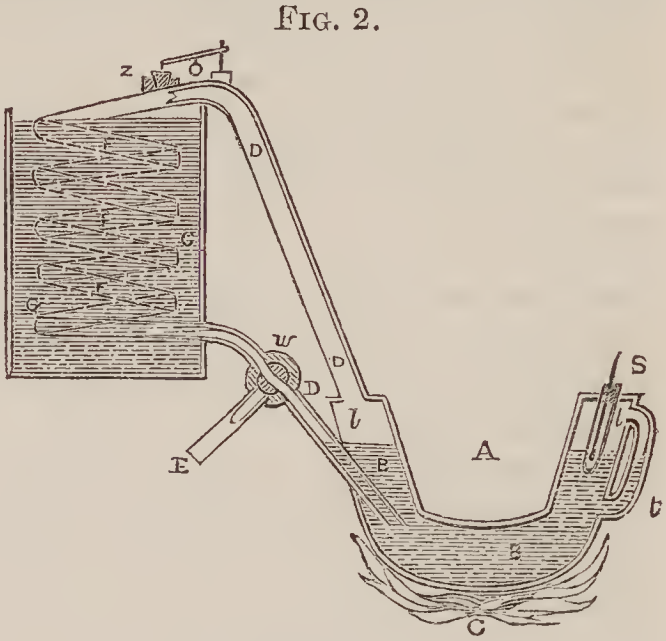
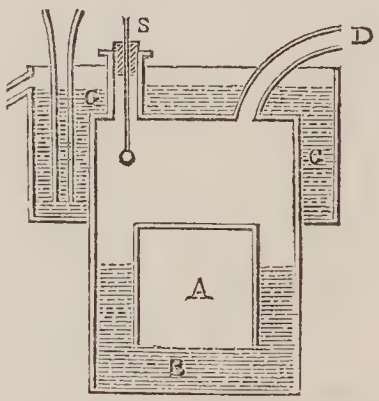


Fig. 3.



supposed to be filled with fluid up to the level, *l*, which may be observed by the glass tube *t*, connected with B; *s*, a thermometer, which may be inserted in any convenient manner, and is here represented as placed in a tube closed at its lower end, and fixed air-tight into the top of the boiler, the thermometer passing through a cork in the open end of the tube. D, the neck which leads to the upper condenser, and through which, in fig. 1, the condensed fluid flows back to B; E a neck or pipe through which vapour may be conducted away from B to a still-worm and separate receiver, if required, and which is closed by a tap, *x*, when the temperature is required to be constant. F, the reverberating condensing vessel (which, in fig. 1, is a chamber, and in fig. 2 is a worm) from which the condensed fluid is returned through D to the boiler. F may be provided with a lightly loaded safety-valve, *z*, so that the vapours may escape if they are at any time given off more rapidly than condensation takes place; or F, in fig. 1, may be provided with an additional pipe E, through which any vapour which escapes condensation in F, may be conducted off to a separate condenser. G, the cistern which surrounds the condenser, and which is kept full of water, which, if the temperature required in A be lower than

212° Fahr., must be as cold as possible, and constantly renewed. If the heat required in the bath be above the boiling point of water, the water around the condenser need not be renewed, but may be allowed to rise in temperature till it boils, and may be gradually replenished as it evaporates. The heat rendered "latent" *i. e.*, converted into atomic repulsive force in the ebullition of the water, is quite sufficient (if the condenser be large enough in proportion to the boiler, and the fire be not too fierce) to cause all the oil vapours from which it is abstracted, to revert to the liquid state, when these are the vapours of fluids having boiling points higher than that of water.

Fig. 3 represents a simpler apparatus suited to laboratory work on the small scale. A is the oven or chamber to be heated ; B, the boiler, which surrounds A, and is simply surmounted with an outer vessel or jacket, G, open above, and supplied with water, which will condense all the vapour that rises from below, and return to the boiling fluid. D, the escape pipe for any uncondensed vapour ; S, the thermometer, reaching to the interior of A.

Let us now suppose that a temperature of 450° Fah. is required to be constantly maintained in the oven, A, fig. 1. A quantity of heavy coal naphtha sufficient to fill the boiler, B, to the highest level of the guage tube, must be poured in. The cocks are turned—*y* off, *x* on—and the fire is lighted. The oil will begin to boil at about 350°, and the vapours given off will escape by the neck, E (and will be condensed and received in a separate apparatus ; all here received is kept apart in case a lower constant temperature is required in the bath at another time, when it, or a part of it, must be added to the bath-charge and the preparation commenced as before). As the distillation goes on, the temperature will rise, and more of the original oil must be added, so as to make up the proper quantity in the boiler. At last, the temperature will be found at the desired point, with a sufficiency of fluid in the boiler. The cocks must now be turned again—*y* on, *x* off—all the vapours now given off will pass into the chamber, F, and being there condensed, will trickle back into the boiler, where they will be again vapourized, and this process going on in endless succession, the temperature will be maintained invariable at 450°. If, again, a constant temperature of 190° Fah. be required in the apparatus, fig. 2, the outer boiler, B, must be charged with such a mixture of pyroxylic spirit and water as will commence to boil a little below 190° ; the three-way cock, *w*, must be turned, so as to open the passage from the boiler and the worm to the escape pipe E, and distillation must be continued till the temperature reaches 190° Fahr. The cock is then to be turned so as to close E, and pass all the fluid condensed in F back through the pipe D to B*.

It may seem dangerous to use inflammable fluids in this manner, but it must be remembered, that the quantity required is not large, and that the whole is to be in tight vessels, having at most only one communication by a single pipe with the air, which, as in a common still, will of course be distant from the fire. The liquids which would be used for the higher temperatures, are very slightly inflammable ; a lighted candle may be held to the mouth of a still-worm from which the hydro-carbons of coal tar, which boil at above 280° Fahr., are running, without any inflammation ensuing ; indeed, a burning torch may be plunged into a vessel full of these

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* A mixture of equal parts of water, and of such wood-spirit as boils at 160°, will enter on ebullition about 180°. In any case, a preliminary experiment, made with a couple of ounces of fluid in a small glass retort, with a thermometer, will give information as to the quantity of spirit requisite to bring down the incipient boiling point to a few degrees below, or even exactly to, the mark required.

oils when cold, with no other result than that of extinguishing it. None of these substances will take fire except when in a state of vapour, and the very volatile ones alone give off sufficient vapour at common temperatures to enable them to kindle at a lighted match.

It will be seen too that the temperatures between 300° and 550° may be regulated more cheaply and easily than the lower; first, because the liquid employed is very inexpensive; and, secondly, because the constant stream of cold water is not required for condensation. Neither is any of the material wasted, the same stock lasting for any length of time; the machine being always wound up and ready to start at the same temperature whenever required. The odour of the substances should form no obstacle to their use, as when once placed in the boiler, they need never be exposed again, nor any removed, except by distillation, when a higher temperature is required. If however, a purer material is preferred, the deodorizing processes are simple, but it would be out of place to describe them here.—*Mechanic's Magazine.*

SCHLIPPE'S ANTIMONIAL SALT (*SEL DE SCHLIPPE*).

BY M. VAUDEN CORPUT.

This salt is prepared in the following manner:—Mix together intimately,

Effloresced sulphate of soda,	8 parts.
Sulphuret of antimony	6 parts.
Charcoal	3 parts.

Put the powder into a covered Hessian crucible, and expose it to a red heat until the fused mass ceases to throw up a scum, and it is judged that the sulphate has been decomposed: then boil the residue in a porcelain dish, with one part of sulphur and a sufficient quantity of distilled water. Filter the liquor, and put it to crystallize by slow evaporation. After some time it will yield colourless or slightly yellowish crystals, in the form of tetrahedrous, having a saline hepatico-metallic taste.

This salt is insoluble in alcohol, but soluble in three parts of cold water. Its composition is thus represented, 3 Na S+Sb S_5+18 HO. It has been substituted with advantage for Kermes's mineral.—*Journal de Pharmacie.*

WHOLESALE POISONING BY THE USE OF EMERALD GREEN IN CONFECTIONARY.

An inquiry has been instituted at Northampton, before the county coroner, Mr. Hicks, respecting the death of Mr. William Cowfield, an accountant, who, with twenty others, was poisoned at a public dinner given on the 7th of June. The magistrates hearing of the fatal result, directed the police to seize the remnants of the dinner and all the cooking utensils, in order that they might undergo a close examination by the medical gentlemen. Mr. Sharp, one of the magistrates, questioned Franklin, the pastry-cook, who provided the dinner, as to what he used in the colouring matter for the blanc-mange. He replied, *emerald green.* He was told that it must be poison, as all mineral greens were poisonous. He remarked that he had frequently been told so, but he did not know it of his own knowledge, as he thought it was extracted from spinach. He then added, that Randall, his assistant, made the blanc-mange and jelly, and he made the soup. Messrs. Faircloth and Bryan, surgeons, who made the *post-mortem* examination, deposed to the highly inflamed state of the stomach and intestines of the deceased, the result of some violent irritant poison. Mr. Greville, who analyzed a small portion of the colouring matter left on the blanc-mange, stated that he had succeeded in detecting copper in it. The whole of the evidence having been taken, the coroner

addressed the jury, and at some length explained the law as it applied to the case. The jury then consulted together, and at eleven o'clock at night returned a verdict of Manslaughter against Edward Franklin and Edward Randall. The necessary documents were then made out and signed for their trial at the ensuing assizes. The deceased gentleman was sixty years of age.

MINERAL NAPHTHA A REMEDY FOR CHOLERA.

At a recent meeting of the Medico-Botanical Society, Mr. Guthrie read letters which had been received from Prince Woronzow, the Commander-in-Chief of the Russian forces in Circassia, and from Dr. Andreosky, his physician, detailing a new and successful plan of treating cholera. It would appear that the Prince's attention was first drawn to the matter, by noticing that a certain regiment of Cossacks suffered but slightly from cholera as compared with the other troops. On inquiry of the Colonel, he learned that the recovery of the Cossacks was attributed to the use of an elixir, called the Elixir of Woronege—a preparation of a somewhat quackish description, the principal important ingredient of which was naphtha. Dr. Andreosky, finding the quantity of elixir in possession of the Colonel to be but small, determined to try naphtha by itself; he first used it in mild cases of cholera and of choleraic diarrhœa; proving successful with these, he administered it in the more severe cases with equal advantage, and finally found it effect a cure even during the most extreme collapses. The dose which he gave, was from ten to fifteen and twenty drops in a glassful of wine, repeated if the first dose did not remain on the stomach, or if the symptoms required it, which was not often the case. The naphtha used in the Russian army is not the ordinary naphtha of the shops, but the mineral naphtha obtained from Beker on the shores of the Caspian. It should be of a white or rose colour, and used without previously undergoing the process of distillation. Mr. Guthrie stated, in conclusion, that he had sent to Circassia to procure a bottle of this naphtha, and when he had received it, he would place it in the hands of the secretary, that the members might be able to ascertain precisely what are its properties.

ONE HUNDRED GUINEAS PRIZE ESSAY.

A Prize of One Hundred Guineas will be given for the best Essay on the use of Alcoholic Liquors in Health and Disease.

The essay must contain answers to the following questions:

First.—What are the effects, corporeal and mental, of alcoholic liquors on the healthy human system?

Second.—Does physiology or experience teach us that alcoholic liquors should form part of the ordinary sustenance of man, particularly under circumstances of exposure to severe labour or to extremes of temperature? Or, on the other hand, is there reason for believing that such use of them is not sanctioned by the principles of science, or the results of practical observation?

Third.—Are there any special modification of the bodily or mental condition of man, short of actual disease, in which the occasional or habitual use of alcoholic liquors may be necessary or beneficial?

Fourth.—Is the employment of alcoholic liquors necessary in the practice of medicine? If so, in what diseases, or in what forms and stages of disease, is the use of them necessary or beneficial.

1. Each essay must be accompanied by a sealed envelope, containing the real name and address of the author, and superscribed with a name or

motto, similar to that attached to the essay ; only the envelope of the successful Candidate to be opened by the adjudicators.

2. It is desired (but this is not an essential point) that the essay should not extend beyond 250, nor fall short of 120, pages of print of medium size in octavo.

3. The essay must be written in a clear, legible hand, on one side of the page only ; and must be delivered to the undersigned address, on or before the 31st day of December, 1848.

4. The successful essay will remain the property of the donor of the prize, and will be published.

5. The names of gentlemen of the first literary and scientific talent, to act as adjudicators, will be shortly announced.

Signed on behalf of the Donor { CHARLES GILPIN. / THOMAS BEGGS.

London, 5, *Bishopsgate Street Without*,
January 1st, 1848.

[The above should have been forwarded to us in January. Although received late, we insert it in case any of our readers should think proper to embark in a subject no less interesting in a chemical than in a moral point of view.—ED.]

PRESENCE OF ARSENIC IN MINERAL WATERS.

MM. CHEVALLIER and Schaueféle have determined, by a series of experiments, the presence of arsenic in minute quantity, in the waters and the deposits of some mineral springs of the Upper and Lower Rhine. Among the waters in which this constituent has been found, are those of Chatenois, Soultzbach, Soultzmatt, Wattvieler, and Niederbroun.—*Comptes Rendus.*

ROYAL INSTITUTION.

PROFESSOR FARADAY'S LECTURE UPON SOME NEW DISCOVERIES RELATING TO THE DIAMOND.

THE lecturer directed attention to the well-established identity of the diamond with carbon, and pointed out the peculiar physical distinctions which characterize this element in its several forms of charcoal, coke, plumbago, and diamond. He offered no explanation of his own for this remarkable variation of properties, but quoted Professor Graham's suggestion, that possibly a difference in the specific heat of these bodies might be, at least, one cause of their dissimilarity, the usual explanation of the phenomena of isomeric compounds, by supposing a different system of grouping in the arrangement of the parts, being clearly inapplicable to an elementary substance.

After making a few experiments in proof of the facts advanced, he proceeded to describe a process by which the direct conversion of the diamond into coke had been actually effected recently by a continental Chemist, and to illustrate this phenomenon by a repetition of the process. This effect was stated to be produced by placing the diamond upon the positive electrode of a powerful battery, and bringing the negative wire within striking distance, immediately over the centre of the diamond. The visible effect was a column of flame of intense brightness, and possessing extraordinary calorific powers, which completely enveloped the diamond, and under these circumstances the

conversion into coke takes place. The discoverer of this result has stated that the success of the experiment depends upon the accuracy with which the adjustment is made, and that it is not attained unless the diamond is completely encircled by the electric discharge. Professor Faraday, therefore, believes that some other force is at work besides the intense heat, which is one effect of the discharge, and that when the diamond is situated in the axis of force, it is converted into coke by the specific action of that force, having its substance expanded, or as it were opened out, and, consequently, its specific gravity diminished.

May it not be that when a thin film of a non-conducting body, such as the diamond, is interposed between a strong electric circuit, it is incapable of totally opposing the passage of electricity through its substance, and that being penetrated to a small extent, it acquires increased conducting power, which is one of the points of difference between the diamond and carbon? If this might be assumed, it would not be difficult to understand that the change of density might arise from the disruptive power of the discharge.

There were present upon the table several varieties of the diamond, and amongst them three black diamonds lent by Mr. Morson. The history of these very interesting specimens is unfortunately not easily ascertained; they appear to form a link of transition between the diamond and coke, differing from both in physical properties, such as density and external appearance.

Professor Faraday concluded by remarking, that since the discovery that it was possible to convert the diamond directly into coke, the much agitated problem of converting coke or carbon into diamond could not but be regarded as a more hopeful speculation than heretofore.

CHEMICAL SOCIETY.

April 17th, 1848.—The President in the chair. The following paper was read:—

"*Researches on the Volatile Bases*," by Dr. A. W. Hofmann.—*Actions of Cyanogen on Aniline Toluidine and Cumidine.*—On examining the action of cyanogen upon several of the volatile bases, Dr. Hofmann found that, contrary to what might have been expected, no substitution takes place, direct compounds of these bases with cyanogen being produced still retaining the basic properties of the original substances.

An alcoholic solution of aniline, when subjected to a current of cyanogen, absorbs this gas in considerable quantity, a variety of compounds being formed. The principal product of the re-action is a crystalline body, which may be purified by washing with alcohol, dissolving in dilute hydrochloric acid, and precipitating with potassa. On re-dissolving this precipitate in boiling alcohol, the new compound is deposited in thin, colourless, and inodourous crystals, possessing a peculiar silver-like lustre. These crystals are insoluble in water, and sparingly soluble in boiling alcohol and ether; they are not volatile without decomposition.

The composition of these crystals is expressed by the formula—

$$C_{14}\ H_7\ N_2 = C_{12}\ H_7\ N,\ Cy$$

They are aniline, associated with the elements of cyanogen, and may therefore be called *cyaniline*.

Cyaniline is a well characterized although weak base. It forms definite and well crystallized salts with most acids, several of which compounds were analyzed.

Hydrochlorate..	C_{12} H_7 N, Cy.	H Cl.		
Hydrobromate	C_{12} H_7 N, Cy.	N Br.		
Nitrate.....	C_{12} H_7 N, Cy.	H NO_6		
Platinum Salts	C_{12} H_7 N, Cy.	H Cl.	Pt. Cl_2.	
Gold Salts	C_{12} H_7 N, Cy.	H Cl.	Au. Cl_3.	

These compounds are, in fact, aniline salts; to which the elements of cyanogen have been added; although it was found impossible to produce them directly by the direct action of cyanogen on aniline salts. The salts of cyaniline, especially if an excess of acid be present, are soon decomposed, with reproduction of aniline, the cyanogen undergoing peculiar transformations, which will be described in another paper.

The analogues of aniline, *viz.*, toluidine and cumidine exhibit exactly the same comportment with cyanogen; they produce two new basic compounds:

Cyanotoluidine.....	C_{14} H_9 N, Cy, and
Cyanocumidine	C_{18} H_{13} N, Cy.

Nicotine and Leucoline seem to belong to another class of bases; on treatment with cyanogen, they did not yield similar compounds.

In conclusion, the author remarks that the new cyanogen bases are some of the first instances of a kind of compound bases, for which we no longer possess the corresponding class among the acids. They must be considered as congregated bases, and if the view of Berzelius be adopted, who regards all organic alkaloids as congregated ammonia compounds, we have to look at these new compounds as congregated bases of the second order.

May 1st, 1848.—The President in the chair. The following papers were read.

"*On some Phenomena of Capillary Attraction, observed with Chloroform, Bisulphuret of Carbon, and other liquids*," by G. Wilson, M.D., Edinburgh. When chloroform is placed in a test-tube or other glass vessel, its surface, like that of most other liquids, exhibits a concavity upwards: if water or dilute acid be poured upon it, the curvature is immediately reversed, and the surface of the dense liquid becomes convex upwards. When, instead of the acid, a dilute solution of alkali is brought into contact with the chloroform, all curvature on the surface suddenly disappears. When a drop of chloroform is placed in a vessel of water having a flat bottom, and then submitted to the alkaline solution, it flattens out on the bottom as if it had been exposed to a crushing force. On slightly super-saturating the alkali with an acid, the flattened chloroform starts into its previous globular shape, with a momentum and rapidity such as might be exhibited by a highly elastic substance. These alterations in the curvature of the surface may be produced any number of times successively, by alternately rendering the liquid above the chloroform acid or alkaline. These phenomena are much more conspicuous when the chloroform is coloured

by means of litmus. Dutch liquid, bisulphuret of carbon, and some of the volatile oils, which are heavier than water, are acted upon in the same manner as chloroform by acids and alkalies. The author appeals to the three following facts, as proof that the phenomena described are due, in a great measure, to an action of the liquids upon the mutual attractions of the particles of the chloroform, independently of any action upon the solid containing vessel:—1. Chloroform rapidly wets and sinks in alkaline solutions;—2. When chloroform is shaken with these liquids, it breaks into more numerous and smaller globules than in water or acids;—3. When, from a narrow pipete, an alkaline solution is dropped on a large globule of chloroform under water in a wide vessel, the globule begins to flatten before the alkali can have reached the bottom so as to act on the solid. He consequently connects the phenomenon of the flattening of chloroform under alkalies with the chemical affinity of the latter bodies for it, and its rounding under acids or water, with the comparative indifference which even the strong acids exhibit towards it. This attractive power of chemical affinity is, however, probably not the only cause at work in producing the effect.

"*On the Mineral Waters of Cheltenham*," by Messrs. F. A. Abel and Thomas H. Rowney. This communication forms the second of the proposed series of analysis of the waters of mineral springs, which is in course of investigation in the laboratories of the Royal College of Chemistry. It includes the wells of the King's Spa saline, King's Spa sulphur and saline, Cambray chalybeate, and the Pitville saline. The authors, after giving a short account of these springs, detail the processes of analysis adopted in each case, and this is followed by the results, to which is also appended a tabular view of the results of previous investigations.

TO CORRESPONDENTS.

D.L.T.—Solution of alum has been used for rendering muslins, &c., non-combustible. Solution of silicate of soda is also recommended for the same purpose.

J. F.—The usual dose of cod-liver oil is a table-spoonful, which may be increased to two or three, if the stomach will bear it. The cases for which it is chiefly recommended are general debility, consumption, scrofula, and other constitutional disorders. Its efficacy appears to depend partly on its nutritious properties. We cannot give any chemical test for recognizing the purity of cod-liver oil. Its sensible qualities are the best criterion: it should be of a light colour (like oil of almonds), free from rancid smell, having an odour like that of fresh-boiled cod-fish.

H.H.—We cannot recommend any concentrated preparation as a substitute for *decoctum taraxaci*. The liquor taraxaci is quite different, generally containing twenty or thirty per cent. of spirit. It is made by various Chemists according to their own formulæ, and is, therefore, not at all uniform. The only approximation to an imitation of the decoction would be a solution of a corresponding proportion of carefully prepared solid extract.

Medicine Stamp Act.—*L. M. N. O. P.*—Aromatic vinegar, if sold without printed directions, does not require a stamp, although enumerated in the schedule of the Act under the name of "Aromatick Spirit of Vinegar;" the law is not enforced by the Board in this case, unless the article be sold with a recommendation.

C. F.—Although it may be policy in business to exchange goods which have become speedily mouldy, or prove defective in quality, we have no authority to lay down the law in such cases, and the publication of the letter of our correspondent might occasion unpleasant feelings, without any equivalent advantage. The specimen is forwarded as requested.

"*Enquirer*," intending to emigrate to New South Wales, requests to be informed what general articles would be the best to take as stock?—[The list would occupy several pages; it would resemble an ordinary fitting-up order—comprising a large supply of castor-oil, Epsom and Glauber salts, and other common articles used for cattle.]

A. P. S. M. wishes to know whether the Amyris Giliadensis can be obtained genuine in London? We presume he means the oleo-resinous exudation called Balm of Gilead. There is a specimen in the Museum of the Society, but we are not aware of any being in the market.

A.P.S.—Tincture of myrrh and borax is made by several Chemists, each using his own formula, to which we have not access.

W. V. Dutton.—It is not likely that any Pharmaceutical or Medical Bill will be passed during this session. Until we know the fate of the bill about to be brought forward by the Medical Registration Committee, it is impossible to predict what progress may be made in the Pharmaceutical department. The Council will use all their endeavours to bring the subject forward, as soon as the proper opportunity arrives.

Mr. Clark.—We have received several communications on the same subject; but think it desirable not to enlarge upon it at present. It is policy not to meet troubles half-way, but to be quite prepared to combat them if they should arrive. Having directed the attention of our readers to the subject, we shall report progress when occasion requires. Nothing fresh has transpired since last month.

Henry Long.—Registered Apprentices as well as Associates have the privilege of admission to the Library and Museum without extra fee. The fee for attending the lectures is half the amount which is paid by persons not belonging to the Society.

T. S. C.'s communication has been received.

℥j. ʒj. ℈j.—Spongy platinum is prepared by heating the ammonio-chloride of platinum to redness.

Δ. *A. P. S.*—The use of spirit in making the medicinal distilled waters has been thought to improve the *flavour* of those which are distilled from fresh plants, but the waters *keep better* without it. Many of the distilled waters, including that of peppermint, are better prepared from the essential oils than from the vegetable substances yielding them. This remark does not apply to cinnamon water, which should always be distilled from the bark.

Advertisements to Mr. CHURCHILL, Princes Street, Soho.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. SMITH, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the EDITOR, 338, Oxford Street, before the 20th of the month (if Answers are desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. II.—AUGUST 1st, 1848.

THE MEDICAL REGISTRATION COMMITTEE.

The labours of this Committee are drawing towards a close, and the report will shortly be presented to Parliament. We are informed that it is not the intention of the Committee to bring in a Bill at present, but to leave the report for the consideration of the profession until next session, when the subject will be resumed. The wisdom of this decision cannot be doubted. There is too much urgent business before the House to admit of due attention being given to a Medical Bill at this late period of the session, and we suspect the Members generally would be disposed to "throw physic to the dogs."

It is also desirable and proper to give the profession an opportunity of seeing the whole of the evidence already taken, before the result has assumed a form in which opposition, if offered, would impede or frustrate the measure. In the event of any deficiencies being found in the evidence these might be easily supplied by calling other witnesses ; but the Bill, when introduced, must stand or fall according to its merits.

While the avowed leading object of a Medical Bill is to protect the public against the ignorance or imposition of irregular practitioners, the public take but little interest in the subject, and, therefore, leave it in the hands of the profession. The profession consists of numerous rival bodies and cliques, each of which is striving to obtain a good position in the arrangement, while all with equal earnestness use the public as a stalking horse, as if the public safety were the only object of their solicitude.

The pivot upon which the whole question turns is the "loaves and fishes." There is a certain amount expended by the public annually in the purchase of advice and medicine, and it is for the legislature to decide, first, whether the whole of this amount shall go into the pockets of qualified practitioners ; and secondly, what shall be the relative position of the several classes—regard being had to the fact that the position of a practitioner has an important influence in determining the amount of patronage and consequent emolument which he is likely to enjoy.

The aim and object of the recent conference between the representatives of the leading medical bodies, was to effect a satisfactory adjustment in the position and privileges to be enjoyed by each—in other words, to divide the proceeds into fair and equitable slices. If there had been enough to satisfy all, the task would have been

easily accomplished; but this unfortunately was not the case, and some ingenuity was therefore requisite in order to conciliate those who might otherwise have raised an inconvenient opposition.

By way of simplifying the business, and avoiding one source of difficulty, it was decided in the first instance to exclude Pharmacy from the discussion, leaving that branch of the profession for future arrangement. The parties admitted into the conference were the Colleges of Physicians and Surgeons, the Society of Apothecaries, and the National Association of General Practitioners. The two latter bodies practise Pharmacy as well as Medicine and Surgery, therefore the exclusion applied rather to the Pharmaceutical body than to Pharmacy itself. The loaves and fishes arising from that department are to be thrown into the general scale, to increase the amount of the dividend, and make the result more pleasing and satisfactory. The division being made, the medical Pharmaceutists satisfied, and the House of Commons worn-out *usque ad nauseam*—with the whole question of medical reform, the Chemists are to come into the field, and find some member or members, *if they can*, who will renew in the House a subject already disposed of by a side-wind. If this endeavour should prove abortive, as it probably would under such circumstances, the Pharmaceutical body would be excluded altogether from the pale of the profession, merging into the motley ranks of free-traders in medicine, which comprise grocers, oilmen, hucksters, and general dealers.

That this is the policy adopted by some of the parties concerned in the movement, and tacitly acquiesced in by others, may be inferred from the line of conduct pursued by the Committee in reference to Pharmacy, and also from the specimen of evidence quoted in our number for June (page 553). The inference is confirmed by a significant observation of a member of the Committee, when interrogated as to the motive for excluding Pharmacy; he replied, "We want no Chemists and Druggists, the General Practitioners are dispensers of medicine and legally qualified."

If the Committee had given us any reasonable grounds for expecting fair play, or if there had been even a doubt as to the policy which had influenced its proceedings, we should have reserved our comments until the appearance of the Bill, trusting to the chance of a fair hearing in due time; but observing so palpable a disposition to place the Pharmaceutical body on the shelf, we think it our duty to warn our brethren of the prospect before them, believing as we do that such a course, if persisted in, will inevitably renew and increase the confusion and jealousy which we have always endeavoured to counteract by advocating an amicable arrangement between the two parties concerned.

The following quotation from the *Dublin Medical Press* will serve to corroborate our views on the subject. After quoting the evidence to which we have already adverted, the Editor observes,—

"It is clear as the sun at noon-day that the Apothecary yearns after the profits of the Chemist and Druggist on the one hand, while he as vociferously and importunately demands the lion's share of the Physicians and Surgeon's income. He must 'keep open shop' to draw customers of all kinds, while he must, under the title of General Practitioner, enforce his claim to practise in every department. He must, in fact, be Physician, Surgeon, Accoucheur, Apothecary, Chemist, and Druggist. He claims these privileges as a right, and pleads time, custom, and usage in defence of his usurpations. But what follows? He is hemmed in between the Chemist and Druggist on the one hand, and by the Physician and Surgeon on the other. He is sorely pressed, and roars lustily, but cannot tell which way to turn him. He will be a General Practitioner to-day, an Apothecary to-morrow, and perhaps a Chemist presently. In the mean time the Chemists take possession of the position he has abandoned."

The Chemists must be firm in maintaining that position, resisting the encroachments of medical shopkeepers on the one side and general dealers on the other, and above all things, avoiding the fatal error of becoming General Practitioners. Altercations and hostilities will never cease until Pharmacy is established by law as a distinct branch of the profession.

Since the above was in type we have ascertained that the medical profession is not unanimous, the College of Surgeons being, on some points, at issue with the other medical bodies. Unless this difficulty should be overcome, the forthcoming Bill will, most probably, share the fate of its predecessors, since unanimity in the profession is essential to a successful result.

It is equally true with respect to our own body, that unless we continue unanimous, and persevere in our exertions, we shall be checkmated at last.

THE CHOLERA AND THE POOR-LAW COMMISSIONERS.

The serious ravages of the cholera at Moscow, St. Petersburgh, and Constantinople at the present time, and the steady progress westward of this mysterious and fatal disorder, afford grounds for apprehension that it may at no distant period arrive in this country. Numerous theoretical pamphlets and treatises, as well as some practical suggestions, have been published on this subject since the last visitation, but the opinions of medical men appear to be so much at variance with each other, and many of them founded on so little actual experience, that we may fairly consider the profession at fault. In the absence of cases on which to test the efficacy of any mode of treatment that may be proposed, theories become idle speculations, and no satisfactory deductions can be made for want of clinical evidence. During the former epidemic, the truth

of this observation was illustrated, as not a few medical men who had previously published their views, were disappointed in the results when their theories were put to the test.

Among the remedies and treatment already suggested by various authorities, may be mentioned calomel and opium, mustard (internally and externally), oil of cajeput, cloves, or peppermint, acetate of lead, astringents, and cretaceous mixtures, naphtha, salt and water, phosphate of soda, chlorate of potash, rhubarb and magnesia, hot water, cold water, ice, the vapour or hot air bath, bleeding, the injection of solutions of various salts into the veins, with numerous nostrums and alleged specifics, chiefly consisting of tonics and aromatics.

As soon as the cholera appeared on the former occasion, handbills were circulated and paragraphs inserted in the newspapers, recommending in turn some one or more of the above remedies; and preventive packages were bought with avidity, which pressing demand gave rise, of course, to a corresponding supply. Cajeput oil rose from 3*s.* an ounce to a guinea, and many other medicines advanced in a similar manner, until the supply (of the genuine articles) becoming scanty, it was discovered that they were not specifics, and some fresh drug was recommended in preference. It had, in fact, become a means of disposing of dead stock, since it was only necessary to send a paragraph to the newspapers recommending any particular medicine for cholera, and there was immediately a run upon the article. As soon as the epidemic had subsided and the panic was over, the preventive packages became "a drug in the market," and might be had on any terms, unopened.

On looking back at the experience of the past, it may be asked, Are we any better prepared to combat this fearful epidemic than we were in the first instance? This is a question which does not come within the province of the Chemist, nevertheless, in the event of the cholera making its appearance, every Chemist in the country will be besieged with applications for remedies or preventives, and however unwilling he may be to incur the responsibility of giving advice, he will not be able to shrink from responsibility altogether when applied to for remedies of the most opposite description to be used or kept in reserve for the same purpose, the usual question being asked, "Can it do any harm?"

We would strongly advise our brethren in such a dilemma to refer the parties to medical men; but in so doing we may be allowed to ask, Have medical men arrived at any definite conclusion as to the nature and treatment of this fearful disorder? This is an important question, for if one blow hot, another cold, and a third lukewarm, the patient might as well trust to the chapter of accidents or the *vis medicatrix naturæ*.

The urgency of the case calls aloud for an official and deli-

berative investigation on behalf of the profession at large, by active and competent committees, and delegates to localities where the cholera prevails. Every available means should be taken to obtain practical information, the result of which should be circulated on authority in the form of general instructions to Medical Practitioners. In the absence of active measures of this description on the part of those who are *ex officio* the guardians of the public health, quacks and impostors will take the initiative, and the public will be at the mercy of Morison, Holloway, and Company.

The Poor Law Commissioners have made some official inquiries in reference to the capability of the workhouse infirmaries to receive cholera patients, and have published the following suggestions for general adoption:

"1. We would urge the necessity, in all cases of cholera, of an instant recourse to medical aid, and also under every form and variety of indisposition; for during the prevalence of this epidemic, all disorders are found to merge in the dominant disease.

"2. Let immediate relief be sought under disorder of the bowels especially, however slight. The invasion of cholera may thus be readily and at once prevented.

"3. Let every impurity, animal and vegetable, be quickly removed to a distance from the habitations; such as slaughter-houses, pig-sties, cesspools, necessaries, and all other domestic nuisances.

"4. Let all uncovered drains be carefully and frequently cleansed.

"5. Let the grounds in and around the habitations be drained, so as effectually to carry off moisture of every kind.

"6. Let all partitions be removed from within and without habitations, which unnecessarily impede ventilation.

"7. Let every room be daily thrown open for the admission of fresh air; and this should be done about noon, when the atmosphere is most likely to be dry.

"8. Let dry scrubbing be used in domestic cleansing, in place of water-cleansing.

"9. Let excessive fatigue and exposure to damp and cold, especially during the night, be avoided.

"10. Let the use of cold drinks and acid liquors, especially under fatigue, be avoided, or when the body is heated.

"11. Let the use of cold acid fruits and vegetables be avoided.

"12. Let excess in the use of ardent and fermented liquors, and tobacco, be avoided.

"13. Let a poor diet, and the use of impure water in cooking, or for drink, be avoided.

"14. Let the wearing of wet and insufficient clothing be avoided.

"15. Let a flannel or woollen belt be worn round the belly.

"*N.B.*—This has been found serviceable in checking the tendency to bowel complaint, so common during the prevalence of cholera. The disease has, in this country, been always found to commence with a looseness in the bowels, and in this stage is very tractable. It should, however, be noticed that the looseness is frequently unattended by pain or uneasiness, and fatal delay has often occurred from the notion that cholera must be attended with cramps. In the earlier stage here referred to there is often no griping or cramp, and it is at this period that the disease can be most easily arrested.

" 16. Let personal cleanliness be carefully observed.

" 17. Let every cause tending to depress the moral and physical energies be carefully avoided; let exposure to extremes of heat and cold be avoided.

" 18. Let crowding of persons within houses and apartments be avoided.

" 19. Let sleeping in low or damp rooms be avoided.

" 20. Let fires be kept up during the night in sleeping or adjoining apartments, the night being the period of most danger from attack, especially under exposure to cold or damp.

" 21. Let all bedding and clothing be daily exposed during winter and spring to the fire, and in summer to the heat of the sun.

" 22. Let the dead be buried in places remote from the habitation of the living.

" By the timely adoption of simple means such as these, cholera or any other epidemic will be made to lose its venom; so true is it that, 'Internal sanitary arrangements, and not quarantine and sanitary lines, are the safeguards of nations.'"

We know not who are the authors of these suggestions, but coming as they do on the authority of the Poor-Law Commissioners, instead of on that of the Medical Profession, we may be allowed to comment on some of the recommendations which appear to us to be questionable or inconsistent.

In the first recommendation we fully concur; but considering the present state of medical knowledge on this particular subject it appears to be going too far to assert in No. 2, that by seeking immediate relief, under disorder of the bowels especially, however slight, *the invasion of cholera may be readily and at once prevented.* Such an assertion can only tend to awaken distrust respecting the other portions of the article.

No. 3 directs every impurity, animal or vegetable, to be quickly removed to a distance from the habitations—enumerating certain impurities in particular—among these are *slaughter-houses and pigsties.* By whom are these to be removed, and at whose expense? By voluntary arrangement, by legal process, or by magic? *Cesspools* are to be removed (quickly!). Are we to understand that on the approach of the cholera every cesspool is to be stirred up and removed to a distance? The labour of Hercules in cleansing the Augean stables was child's play when compared to this enterprise! *Necessaries* are to be removed to a distance from the habitations. It would be a curious statistical inquiry how many necessaries there are in the Metropolis, and what would be the expense of removing them to Hampstead Heath, Wimbledon Common, or other localities *at a distance from the habitations?* and by what mode of transit the public are to be conveyed to these necessary temples. Alladin's lamp naturally suggests itself.

No. 5 directs the execution of a system of drainage, which we presume will be provided for in the Public Health Bill.

No. 6. By whom and at whose expense are the said partitions to be removed?

No. 8. Could dry scrubbing instead of water-cleansing be applied to a shop floor? would it effectually cleanse a dirty house?

No. 13. A poor diet is to be avoided, and also (No. 14) insufficient clothing. This is a practical suggestion, coming from the Poor-Law Commissioners, and will, no doubt, be generally appreciated by those to whom it chiefly applies. No. 15 suggests another statistical inquiry: being recommended as a *preventive*, it has, of course, a general application, and is likely to cause "a run" upon Welch flannel, the extent of which it would be difficult to calculate.

The other instructions relate to ordinary precautions in regard to cleanliness, ventilation, and diet.

This document, if intended simply to apply to the prevention of cholera, travels wide of the mark, some of its provisions being impracticable, others relating to matters already under the especial jurisdiction of the Commissioners of Sewers and other public bodies. We anxiously look forward to the publication of more explicit, complete, and intelligible recommendations on the subject of cholera from the Medical Profession itself, whose authority would give weight to such a document.

DISINFECTANTS, AND THE RIVAL PROFESSORS.

Among other mercantile enterprises to which the dread of the Cholera will probably afford a stimulus, the compounds offered to the public as disinfectants, will, without doubt, hold a prominent place. While it is desirable, and of the highest importance that every remedy or preventive known to possess efficacy should be made available in case of need, it is equally important for the public to be warned against the error of placing undue reliance on alleged specifics, the value of which has not been satisfactorily established.

We have already pointed out the marked distinction between a deodorizing agent and a disinfectant, and stated the grounds upon which we conceive that the destruction or modification of putrid odours does not imply a neutralization of the contagion with which they are sometimes accompanied. In our notice of some of these preparations now before the public, we gave one of the vendors (Mr. Ellerman) credit for having avoided the general error, by simply recommending his compound as a deodorizer. We observe, however, that in his advertisements, he has followed the example of his rivals, and we are entertained with a vigorous competition and controversy between the three professors of disinfection, Sir William Burnett, Director General of the Medical Department of the Navy, Charles Ellerman, Esq., and M. Ledoyen.

We have before us the printed parliamentary reports and corres-

pondence on the respective fluids of these gentlemen, namely, the chloride of zinc, pyrolignite and perchloride of iron, and nitrate of lead. On glancing over these documents, which are rather voluminous, the most striking fact is the conflicting nature of the statements, each professor or his advocates contradicting the assertions of the other. Among the reports are recorded sundry experiments in deodorizing night-soil, in which the comparative merits of the three rival fluids are brought into competition. Sometimes one professor complains that undue favour was shown to the others to his prejudice; then we have a reply, a rejoinder, an appeal to the nightmen, conflicting analyses, and opinions professional and non-professional, official correspondence, and last, not least, we may mention a curious collection of paragraphs and puffs from the periodical press, and a copy of the handbill in which the magic fluid is enveloped, with the usual caution about the signature and seal of the patentee on the cork. Each fluid in its turn is infinitely superior to the others. Each is described as the best disinfectant as well as deodorizer, but each having two opponents, the evidence is two to one against this testimony.

In the face of this energetic support of the three specifics we have the lamentable fact that Ledoyen's right-hand man fell a victim to the fever which he was sent abroad to allay; and the unfortunate circumstance that, in the recent opening of the sewers in Westminster, several fatal cases of fever occurred, although Sir W. Burnett's fluid was used for deodorizing the miasm.

Mr. Ellerman is more general in his statements about disinfection, and lays much stress on the fact that both the other fluids are poisonous, from which it might be inferred that his is not. In reference to the testimony of the nightmen, Mr. Ellerman states "the men were very much pleased, and preferred our fluid to Sir W. Burnett's." Mr. Roe (surveyor of the Commissioners of Sewers) asserts that the foreman and men "suffered much more from the odour it gave out than they could possibly do by any effluvia from the worst cesspools."

During this spirited investigation chloride of lime appears to have been almost forgotten, the inventor being dead and the article too common to tempt any fresh champion to come forward.

In reviewing the whole evidence we are confirmed in our former opinion, that the three fluids have substantiated their character as deodorizers, but that none of them can be relied on as disinfectants. It would be going too far to say that they possess no efficacy whatever in the latter respect, but the evidence on this point is by no means conclusive. In the event of cholera making its appearance the merits of the rival fluids may very properly be put to the test, but this should not in any degree supersede the adoption of other precautions.

TRANSACTIONS OF THE BRISTOL CHEMISTS' ASSOCIATION.

At the General Meeting of the Bristol Chemists' Association, held on Wednesday, June 21st, 1848, at 44, Broad Quay, Mr. Ferris, President, in the Chair.

The Chairman said he had much pleasure in meeting the Members of the Society on the occasion of its first anniversary. Their business was very simple, it consisted of hearing the Report of the Council, and electing three Councillors and a Secretary, and also to hear any remarks the Members might be disposed to make. He would request Mr. Schacht to read the Report of the Council.

REPORT OF THE BRISTOL CHEMISTS' ASSOCIATION FOR 1847-8.

The Council of the Bristol Chemists' Association, in presenting to the Members of that body its First Annual Report, deem it expedient to state briefly the circumstances under which the Association was formed.

For some years a Society having similar objects had been in existence, under the title of "The Bristol Branch of the Pharmaceutical Society." From causes which it is hoped the present Association will avoid, this institution fell into decay, and by its own laws became extinct. The great utility of such an Association spiritedly and amicably conducted was so evident that a new institution was organized last year, having certain definite objects, and mainly differing from the late Society in the circumstance that it invited to become its members all who were engaged in the trade of a Chemist and Druggist, whereas, the late "Bristol Branch of the Pharmaceutical Society" was necessarily accessible only to such as were Members of the London Society. Your Council would remark, that gratified as they would feel in finding that all in your Society were Members of the "Pharmaceutical Society of Great Britain," they would deeply regret if by any narrowing of the basis of your Society its usefulness had been limited, and its numbers perforce contracted.

The principal objects contemplated in the formation of this Association, were, the promotion of a friendly feeling among the members of the trade, and the improvement of their professional education, especially among its younger portion.

Your Council have reason to hope that these objects have been advanced in proportion to the means at their disposal. Their list includes nearly all the members of the trade in the city, and it is anxiously hoped that those who have not yet joined, will respond to the invitation now held out to them. Through the kindness and zeal of certain gentlemen, a course of lectures on Materia Medica has been delivered before your Members, and for a period once a month, but more recently once in every fortnight—isolated lectures have been delivered on subjects connected with their profession. Your Council have most gratefully to acknowledge the kindness of Dr. Staples in volunteering the course of lectures on Materia Medica, and are much

gratified to find it was attended by a most industrious class, several of whom evinced their proficiency in the subject at the examination held at the close of the course. Your Council have also to offer their best thanks to those gentlemen who have delivered lectures and read papers at the evening meetings: Drs. Symonds, Staples, Brittain, Herapath, and Storer, and Messrs. Martin, Lancaster, Owen, Griffin, Giles, Barge, and Schacht, are thus entitled to their warmest thanks.

Your Council have also to express their sense of obligation to Mr. Jacob Bell, from whom they have received the greatest kindness and sympathy, and who has on all occasions granted them space in his Journal for the publication of their Transactions.

Your Council are able to congratulate the general body of Chemists and Druggists in this city on the success that has attended their efforts to shorten the hours of business; it is hoped the improvement thus manifested will be pursued to its furthest limit.

Your Council, anxious in every way to identify your institution with that of the Pharmaceutical Society of Great Britain, and particularly to assist their excellent project of charity, have opened a Subscription List in furtherance of the Chemists' Benevolent Fund. This is in the hands of the Treasurer of your Society, Mr. R. B. Giles, of Clifton, who will receive and transmit subscriptions to the authorities in London.

Your Council cannot conclude this Report without urging upon the Members generally the necessity of their cordial co-operation to the effective carrying out of their scheme, for while there are many points in the retrospect of the past year which stand out as matters of honest congratulation, they cannot disguise from themselves the existence of great apparent apathy amongst a portion of their Members. Our numbers are too small to allow of indifference in any—if such exist in but few, its result is sadly to cripple the proceedings of the Society—if in many, the institution must necessarily share the fate of its predecessor; whereas, if each Member lend his sympathy and assistance to those having the temporary direction of affairs, the result may be useful and beneficial to a degree exceeding the hopes of the most sanguine.

The Treasurer then read the accounts of the Society, which were reported to have been duly audited.

It was *moved by* Mr. Barge, *seconded by* Mr. Pearce, and carried, "That the Council's Report and Balance-Sheet be adopted."

Messrs. Mahon and Sanders were re-elected Members of Council, and Mr. Fuller was elected to fill the vacancy. Mr. Barge was appointed Hon. Secretary. A vote of thanks was carried for the Council, Mr. Schacht, and the President for his able conduct in the chair, which closed the proceedings of the Meeting.

ORIGINAL AND EXTRACTED ARTICLES.

ON THE CAUSES AND PREVENTIVES OF MILDEW

BY MR. WILLIAM BASTICK.

The term *mildew* is frequently used in a more or less extensive sense, depending on the speculative opinions of those who have attempted to investigate its causes and its consequences. But by the best modern authorities it is applied to those fungi which are found growing in decaying animal and vegetable matter. In a popular sense it is employed to denominate decay of any kind when accompanied with the development of these fungi.

There has been a considerable controversy between some of the most learned naturalists, as to whether these fungi were the result of equivocal generation or not. But as a discussion on this point is foreign to the objects of this essay, it may be passed over, with merely observing that, in the references hereafter to the generation of the mildew fungi, it will be assumed that it is not of a spontaneous nature, from a belief that the weight of the evidence adduced preponderates against such an assumption.

There is another debatable subject in connexion with mildew, which has caused some disputation, and which it is important should be satisfactorily settled, *viz.*, whether mildew is the cause of the decay or the consequence of it in those bodies in which it is found.

If substances in a state of decay be examined, they will be found to have been subject to certain changes dependent chiefly on the nature of their elementary constitution.

Those which consist of oxygen, hydrogen, and carbon, will be found to have undergone a species of slow combustion, with the oxygen of the atmosphere, and those which contain in addition nitrogen, phosphorus, and sulphur, will form with their constituent hydrogen as the results of their decay, ammonia, sulphuretted and phosphuretted hydrogen.

The same chemical changes are effected in decaying organic matter, whether mildew fungi be present or not, by the action of the atmosphere, aided by heat and moisture. The atmospheric humidity and warmth play no further part in the process of the decay of animal and vegetable bodies than that of facilitating the combination of their elements with the oxygen of the air; but as regards the formation of the mildew fungi, humidity is essential to their existence, from the circumstance that these fungi consist of a very large proportion of the elements of water, which they can only derive from this source.

It has been argued that mildew is the cause of decay, from the fact of decaying bodies affected with it appearing to communicate their mildew and decay to bodies in a sound condition. But it is

not necessary to ascribe this result to the mildew fungi, because substances free from mildew and decay can easily be brought into that condition, by contact with bodies in a state of decomposition unattended with mildew. And, moreover, the mildew fungi, separated from decayed matter, will not vegetate on a substance free from decay, or induce the decomposition necessary to their existence. It seems clear from these premises that mildew is merely the frequent consequence or attendant of decay, and not the cause of it.

Upon the hypothesis, assumed by some very able authorities, that the mildew fungi are produced by equivocal generation, that is, produced by the transformation of matter, uninfluenced by the vital power transmitted in any form from the parent stock, the conclusion is inevitable, that decay is the cause of mildew; because the elementary decomposition of matter must necessarily be antecedent to its elementary reconstruction. It appears that the germs of the mildew fungi are almost universally present in organic matter; and are brought into vital activity, apparently in some instances, but not really, simultaneously with the decay of animal and vegetable substances. These substances when decaying, are evidently the soil most suitable to the growth of these fungi, whose germs, having lain dormant for a longer or shorter period, manifest an extraordinary rapidity of development, when placed in such suitable conditions. In fact, these fungi seem to be destined, like certain insect tribes in the economy of nature, to consume as food materials which are obnoxious to other members of the animal and vegetable kingdoms.

It will be manifest from these statements, that practically speaking, it is more important to enquire into the preventives of decay than those of mildew, because by the prevention of decay the formation of mildew is rendered impossible.

As decay is induced in animal and vegetable substances by the decomposing agency of the oxygen of the atmosphere, aided by heat and moisture, and also, is frequently caused by sound bodies being placed in contact with others in a decaying state, which act as a ferment on the sound matter, thereby exciting a similar change in its elementary constitution, it is scarcely necessary to observe, that it is advisable in the preservation of books, parchments, or any organic matter, to avoid as much as possible their exposure to those atmospheric influences which have such a tendency to induce their decay, and to prevent their contiguity to bodies either prone to decay, or already in that condition.

Care should be taken in all manufactures of vegetable material, especially in that of paper, not to use animal substances, such as size, in its preparation, because they are more prone to decay than vegetable fibre, the basis of paper, consequently, the paper which

might have otherwise been preserved for years, becomes decayed and mildewed by the decay of the size with which it is impregnated.

It is highly advisable, wherever it is possible, to have recourse to the direct preservative agency of those chemical compounds which enable organic matter to offer a powerful resistance to the inroads of mildew and decay.

The chemical agents, which, from a multitude of experiments made by various persons, are found to possess this property in the highest degree are arsenic, corrosive sublimate, chloride of zinc, and alum.

I have kept for months, to test their efficacy, vegetable and animal substances, such as cotton and woollen fabrics, leather, paper and parchment, gelatine and vegetable fibre in several forms, in combination with these agents, exposed to those conditions which speedily induced mildew and decay in portions of the same material not similarly protected. From these experiments it may be confidently stated, that corrosive sublimate, when applied to organic matters generally by their immersion, or otherwise, in a solution of this salt, consisting of twenty parts of water and one of corrosive sublimate, they being afterwards properly dried, will prove superior to every other substance as a preservative.

It has also the property of arresting decay, and destroying mildew in any organic matter which may be thus attacked, even when considerable ravages have been made. It is only necessary, in accomplishing this desirable end, to apply the solution to any material, such as covers and leaves of books, &c., carefully and thoroughly, and afterwards to cautiously dry it. This fact may be easily proved, by taking some common paste, made of flour and water, and keeping it a short time, when it will rapidly decay, and become copiously attacked with mildew; thereon, mixing with it a few drops of the solution of corrosive sublimate, when the decomposition will be arrested, and the mildew fungi killed: the paste will afterwards remain without change for an indefinite period. Corrosive sublimate does not discolour paper and parchment in the slightest extent, or in any way damage their eligibility for the purposes to which they are usually applied, and, moreover, it has the quality of rendering ink more durable. It forms with paper and parchments, and other substances, compounds, which not only resist decay and mildew, but also renders them less liable to mechanical disorganization, by the action of water or dampness.

Arsenic has a powerful antiseptic property; but it is not so appropriate for parchment or any gelatinous matter, as it has a tendency to soften animal tissues when under its influence. Neither will it enable organic matter to resist either chemical or mechanical disorganization so long as corrosive sublimate.

Chloride of zinc is not at all suitable as a preservative of paper and parchment, or any organic material, when it is desirable to keep it free from moisture, because, it being a very deliquescent salt, it renders any substance impregnated with it constantly wet, from absorbing the aqueous vapour from the atmosphere. This substance has been patented, and is highly recommended as a powerful antiseptic, but it would seem that this detrimental quality has been entirely overlooked.

Alum is also useful as a preservative of organic matter, especially when it is desirable to avoid the use of poisonous agents, although it is very inferior to corrosive sublimate or arsenic, as a preventive of mildew or decay. The above preventives are suitable for every kind of material derived from organic sources ; but they are quite inappropriate as preventives of mildew or decay when applied to the sources from whence these materials are obtained, *viz.*, organized structures endowed with life, because these chemical agents, excepting alum, when applied in any form, act as a virulent poison on all the members of the vegetable as well as the animal kingdom; consequently, the remedy would be worse than the disease.

There can be but little doubt that there is a striking analogy between these circumstances, under which the living plant, and the dead organic structure become affected with mildew. By *à priori* reasoning, it might be concluded that a vitalised structure would offer a greater resistance to the progress of mildew and decay, than one in which the vital force is absent, because in the former case, there is not only the antagonism offered to decay by the chemical affinities of the constituent elements, as in the latter, but also the antagonism of the vital power, which is superior to it. Experience corroborates this assumption, as may be easily proved, by attempting to communicate mildew and decay to a living plant, and a piece of the dead structure of the same.

There can be but little doubt, that before a plant becomes attacked with mildew, there must be death and decay in a portion of it, preparatory to its being so affected, otherwise there would be no suitable medium for the development of the germs of these fungi.

This death of the plant, or a portion of it, the precursor of its decay, is induced by various detrimental influences operating upon it, such as extreme atmospheric humidity, cold, the presence of noxious gases in the atmosphere, and the absence of those which are essential to its well-being.

It may also arise from the absence in the soil of those inorganic constituents which are the *sine quâ non* of its existence, and from the presence of those substances of a mineral nature, which are inimical to its life ; the absence of sufficient light in most

instances, and the presence of it in a few, will also have a baneful effect on the health of the plant.

When once a part of a plant becomes attacked with mildew and decay, the whole structure may be ultimately destroyed, by the morbid parts acting as a ferment on the healthy portions, therefore the only remedy to arrest the progress of the disease, is the excision of the part affected.

It will be clear from these remarks, that there is no radical remedy for the prevention of mildew in the living organic structure. The only course that is open to us, is to ascertain the means, and apply them, by which the vital force is kept predominant over the constituent elements of the plant, through which influence a vigorous growth and a healthy condition are maintained, which condition is incompatible with the circumstances necessary to decay, and, consequently, the plant can offer no soil suitable for the subsistence of the mildew fungi.

ON THE DEACIDIFICATION OF WINES.

BY ANDREW URE, M.D., F.R.S.

UNDER a somewhat similar title, Professor Liebig* published in his *Annalen* for last March, "a mean" (*ein mittel*) for effecting that valuable object on old stored (*alte abgelagerte*) Rhine wines. "Most of these wines," he says, "even of the most propitious growths, and in the best condition, contain a certain quantity of free tartaric acid, on whose presence many of their essential properties depend. The juice of all sorts of grapes contains bitartrate of potash, and that of those of the young shoots, in good years, is saturated with it. When the *must* of these sorts of grapes becomes fermented, the tartar diminishes in solubility proportionally as the alcohol increases, and a part of it falls along with the yeast. This deposit of tartar increases during the first years of the vatting; the sides of the casks becoming encrusted more and more with its crystals, in consequence of the continual addition of new wine to replace what of the liquid is lost by evaporation, so as to keep the casks full, and prevent the destruction of the whole. But this deposition has a limit. By the filling up, the wine receives a certain quantity of free tartaric acid, and thereby acquires, at a certain point of concentration, the faculty of re-dissolving the deposited tartar. In the storing of many of the finer wines, the tartar again disappears at a certain period. By progressive filling up, the proportion of acid proportionally augments, the taste and flavour of the wine are exalted, but the acid contents make the wine less agreeable in use. Amateurs and manufacturers should therefore welcome a mean of taking away

* See page 90.

the free tartaric acid without altering in any respect the quality of the wine. This mean is pure neutral tartrate of potash. When this salt, in concentrated solution, is added to such a fluid as the above, there results the sparingly soluble tartar (one part of which requires from 180 to 200 parts of water of ordinary temperature for its solution), the free acid combines with the neutral salt, and separates as bitartrate from the liquid. If we add to 100 parts of a wine which contains one-part of free tartaric acid, one and a half parts of neutral tartrate of potash, there will separate by rest at 18°—19° C, two parts of crystalline tartar, and the wine contains now one half part of tartar dissolved, in which there are only 0.2 parts of the original free acid. In this case, 0.8 of the free acid have been withdrawn from the wine."

Such is the Professor's statement of the disease and its remedy, and were the fact proved that the sourness of old vatted wines, either of the Rhine or other vintages, proceeded from excess of tartaric acid, his mean would be equally useful as it is ingenious. In the London Docks, among the many thousand pipes and hogsheads of wine there stored up, numbers remain, from various circumstances till they become so sour, as to be hardly potable. Samples of such damaged wines have been brought to me for analysis and amelioration. My first object was to ascertain the amount and nature of the acidity. That point was approximately estimated by the proportion of a test alkaline solution that was saturated by a given quantity of the wine. Another portion of it being distilled nearly to dryness with the heat of a liquid bath, at the temperature of about 235° Fahr., the whole acetic acid was obtained, along with the alcohol and a trace of ammonia (in the form of acetate) present in many wines, from decomposition of the gluten. The residuum in the retort was generally found to consist of bitartrate of potash, mixed with colouring and extractive matter. It was digested in water, filtered, and tested by Liebig's plan, with a concentrated solution of neutral tartrate of potash, but no precipitate of bitartrate ensued, proving that no free tartaric acid was present. In fact, during the slow fermentation of old vatted wines, much of the alcohol and of the saccharine matter, with the whole of the easily decomposed free tartaric acid, seems to be acetified, which accounts for the large proportion of vinegar obtained in the distillation of such wines. When a little of that distilled liquor is restored to the filtered solution of the residuum, the mixture acquires the property of decomposing neutral tartrate of potash, just as pure vinegar, or malic acid does, by seizing a portion of the potash, and favouring the formation and precipitation of the bitartrate. In fact, the feeblest free acid is adequate to produce this result, on the great principle which forms the ground-work of Berthollet's *Chemical Statics*, a work too little studied by the

modern race of Chemists. If to the acidulous wines in the London Docks (the veritable *alte abgelagerte* of Liebig) solution of tartrate of potash be added as long as any precipitate of tartar takes place, much of the neutral salt is required, and of course much acetate of potash is formed, which, being very soluble, remains in the wine and vitiates its taste. From these facts, which any one may easily verify, it appears to me that the Professor's *Mittel zur entsäuerung alter abgelagerter Rheinweine* is of no practical use. If the recent *must* contains a hurtful excess of free tartaric acid, it may no doubt be got rid of by his method.

I found that one part of bitartrate of potash is soluble in 151 parts of water at 65° Fahr. (about 18° C.) instead of in 180 to 200 as he stated. The specific gravity of the solution is 1.0034.

ON NAPHTHA AND ITS USES.

BY ANDREW URE, M.D., F.R.S.

In the last number of this Journal, a notice was inserted about the curative virtue of mineral naphtha in Asiatic cholera, as verified by Dr. Andreosky, physician to the commander-in-chief of the Russian army in Circassia. The naphtha there employed has been long known as the produce of springs on the north-west coast of the Caspian Sea, not far from the town of Derbend, near the Gulf of Baku, which was incorrectly printed Beker. It is surprising that in the instructions of the Petersburg police board just published, as to the proper precautions and best remedies against cholera, now beginning its ravages in that capital, no allusion whatever is made to naphtha, or to Dr. Andreosky's testimony in its favour. Are we hence to infer that the preceding recommendation of that substance is apocryphal, or that it has since lost all credit with the Russian faculty, by whom the police bulletin was prepared?

The soil near Derbent, from which the naphtha oozes into wells about thirty inches deep, is a clay marl, which is thoroughly soaked with that fluid. It has a pale yellow colour, like that of Amiano near Parma, in Italy, but has a specific gravity of 0.853, while that of Amiano is only 0.836. Their boiling point is about 305° Fahr. Submitted to distillation, it affords a colourless fluid of spec. grav. 0.728, which boils at about 176° Fahr., but has acquired an empyreumatic odour, very different from that of the native product. Barbadoes tar of the best kind differs from these naphthas only in containing a little more bitumen, but it is equally fragrant. When distilled it yields a similar lighter naphtha, but likewise empyreumatic. The native substances are composed of 6 atoms of carbon and 6 atoms of hydrogen; or in 100 parts, of 86 and 14, by Hess's analysis.

Mineral petroleum seems to be very different in constitution

and qualities from the fetid, factitious tar, derived from the igneous decomposition of pit-coal. The latter, according to Mr. Mansfield, is resolvable into six different substances, which he names *alliole*, *benzole*, *toluole*, *camphole*, *mortuole*, and *nitro-benzole*. I do not believe that a series of similar bodies can be extracted from native bitumen or petroleum. Indeed, he himself informed me that the fluid bitumen now being pumped up so abundantly from the Redding coal mines in Derbyshire, of which I furnished him with a specimen, affords no such distinction of products, a result in accordance with my own experience. These differences between the natural and factitious petroleums lead me to conclude that the former are not the result of igneous action, but of that of water upon carbonaceous matter in the mineral strata. In confirmation of which view it may be observed that not only in the above-named localities, but also at Monte Ciaro near Piacenza, at the Lake of Tegern in Bavaria, near Neufchatel in Switzerland, in the Department of the Ain in France, &c., the bitumen is accompanied with a copious flow of water, on which it floats, and from which it is skimmed.

Petroleum of various shades, from the green of the Barbadoes springs to the pale yellow of Amiano, has been long known to possess certain medicinal properties. The rock-oil of Barbadoes, or as it has been vulgarly but improperly called, Barbadoes-tar, has been found an useful stimulant to torpid bowels, promoting in such a temperament the alvine discharge. Its chief value, however, is as an external remedy in a variety of cutaneous affections. But petroleum, either by itself, or combined with any of its solvent essential oils or spirits, would in general act rather as an irritant and rubefacient upon the skin in such cases, than as a purifying, cleansing, and soothing application. In this dilemma, the idea occurred of incorporating the green rock-oil with fine curd soap. Thus a truly balsamic compound has been obtained. When the soap, used with water in the usual way, has cleared out the cutaneous pores, a film of the petroleum is deposited in them, powerfully remedial in many of the morbid affections of the skin. Such petrolized soap has been found to be quite a specific in the prickly heat of tropical regions, and of equal efficacy in the fiery eruptions incident to many persons in temperate climates. Hitherto, no method had been devised for mollifying efficaciously the alkalinity of soap, which being, as in the best white curd article, a definite saline compound of stearic acid. and soda in its most caustic condition to the extent of six per cent., cannot fail to excoriate delicate skins. By the present happy invention, each particle of that salt is enveloped with a film of balsam, which mitigates its irritant, without interfering with its detergent quality. Hence we may account for the preference given to the petroline soap by all who habitually use it at the toilet-table.

DR. JENNINGS'S SACCHAROMETER.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—In your Journal of the 1st July, 1848, you have inserted some observations of Dr. Ure on a saccharometer of my invention. I hope that if am unable to adopt the Doctor's unfortunate style, or imitate its malignity, you will not make that circumstance a cause for refusing the insertion of my reply.

Having been requested by Messrs. Boddington and Co. to get one of my saccharometers made for them, I waited on Mr. Long, of Little Tower Street, and charged him with the construction of the instrument, and furnished him with a copy of the report of Messrs. Brande and Cooper on the Saccharometer, as made to the Commissioners of Customs.

Mr. Long undertook to execute the order, but informed me that he had a saccharometer of his own invention, adapted to cane-juice and syrups, for the use of Colonial planters, sugar-boilers, &c. I gave him a letter of introduction to Mr. Davis (Boddington and Co.), requesting him to examine the instrument of Mr. Long's invention, hoping thereby to save the time that must necessarily be expended in constructing one established on my principle. Mr. Long thanked me, and waited on Mr. Davis with a complete case of instruments; but Mr. Davis declined to purchase them, and desired to have one of my saccharometers.

Messrs. Long and Atlee informed me that they had attentively examined the report of Messrs. Brande and Cooper, and found that sugars tested by them did not indicate any difference in specific gravity, consequently that my saccharometer must be wrong.

I replied that if that was the case, Messrs. Brande and Cooper's report must be incorrect, but that I could hardly believe such to be the fact; and advised Mr. Long to make one of my instruments and put it to practical test with raw sugars: this they agreed to do.

When I visited their shop I did not contemplate being drawn into admissions which I never intended, and, in fact, never made; or to become the object of the united attack of these gentlemen, assisted by Dr. Ure and Mr. Fairie in return for recommending the sale of their own instruments and obtaining them orders for mine,—in either case they alone could be advantaged.

Dr. Ure states that he does not know me;—I am particularly happy to be able to acknowledge this circumstance; but the Doctor *does know* that some twelve years ago he accused me of pirating a patent of his "for separating the molasses from sugar;" and that on my demanding an explanation on the subject, setting forth that he had taken patents five years after the date of my patent for the same invention, he made me an apology in writing and

retracted his former statement. Dr. Ure also knows that some eighteen months ago, I was called upon by the Board of Customs to make a report on five samples of cane-juice; which he had also been charged to analyse by one of the Surveyors-General of Customs. Our reports were so widely different that the Board thought it necessary to command a third report on the same objects by Professor Graham: this was accordingly done. Dr. Ure produced a considerable quantity of molasses from each sample; neither myself nor Professor Graham found any in either specimen, but produced the same amount of crystallizable sugar. Upon our reports the duty was levied and paid. These reports and the products are at the Custom-House. On this occasion I declined receiving any compensation, though repeatedly pressed to accept it. Dr. Ure was paid £2 for each sample; Professor Graham charged £5, or £25 for the whole. I stated that I could not accept any payment, because it would interfere with the interests of *Dr. Ure*, who was generally employed by the Customs. I was informed by Mr. Ross and Mr. Fennings that the Board and most of the practical officers no longer confided in Dr. Ure, and that my refusal on the above grounds was unfounded. If this be the *under-current* alluded to by Dr. Ure in his observations, he has certainly little cause of complaint, *as far as I am concerned.*

I have no right to impugn the Doctor's ignorance of my many patents and other inventions, since on one occasion he patented at great expense, one of my already patented inventions, and made a profit by it; nor his being unacquainted with the many public rewards I have been so fortunate as to obtain, nor do I venture to compare my feeble efforts in scientific discovery with the universal claims made by the Doctor; I hope also to escape the devious, widely-extended celebrity he has acquired. I can only say by way of consolation, that if Her Majesty's Government has been tricked and duped out of £640, of which I confess to have received £500, that the revenue has benefited £16,000 by the use of my saccharometer during the period it was employed at the Customs by me.

I beg to assure you, Sir, that notwithstanding the united opinions of Dr. Ure, and Messrs. Long, Atlee, and Fairie, that I have the most perfect conviction in the correctness of my saccharometer, and in the practical soundness of the report of Messrs. Brande and Cooper; and hope, through a parliamentary vote, of obtaining yet further compensation for this valuable invention, which is as accurate a test for saccharine matter, as the hydrometer is for alcohol; its general use and introduction cannot long be retarded, though particularly disagreeable to all sugar-boilers, whose judgment will be superseded by its use, so that planters, merchants, and brokers will be able to ascertain the exact amount of saccharine value in the raw sugars imported, and consequently less dependent

on the trade. Dr. Ure's laudable zeal for the preservation of the public treasure would have been more advantageously exercised some years ago, when he put the Government to an expense of about £24,000, and some years' time in endeavouring to ascertain a mode of saccharine verification, which ended in the most complete failure, and the establishment formed by him with the public money was broken up.

If Dr. Ure wishes to serve science and the public, he will best effect that purpose by correcting his own errors, and abstaining from splenetic and envious accusations, which only prove him to be labouring under disappointment and neglect, instead of attempting to build his fame on the imputed failings and assumed patronage of other candidates.

I am, Sir, your obedient humble Servant,

H. C. JENNINGS.

London, 24th July, 1848.

DECOMPOSITION OF CHLOROFORM.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

DEAR SIR,—IT is important that the attention of our Members and of the medical profession should be directed to the fact, that pure *chloroform*, under certain conditions, undergoes spontaneous decomposition, which renders it unfit for the purposes of respiration, and may tend to bring a valuable remedy into disrepute. Air and light appear to be the agents causing this change, which takes place most readily when the chloroform is exposed to the direct rays of the sun, in bottles containing only a small quantity of the liquid, and therefore a large proportion of common air. Free chlorine, hydrochloric acid, and probably other compounds of chlorine are formed, but I am not, at present, prepared to state the order of their formation. Fortunately, they are easily detected and removed. For the former purpose it is only necessary to examine the specimen with litmus paper, the colour of which will not be changed if the chloroform be good. If, however, the colour of the litmus be reddened or destroyed, the chloroform must be submitted to a process of purification before using it. The purification may be completely effected by repeated agitation with distilled water, until it ceases to change the colour of blue litmus. I have observed, that if the chloroform be kept under water, the decomposition alluded to does not take place.

Yours, truly,

T. N. R. MORSON.

ON THE COMPOSITION OF THE CALAMINE OF COMMERCE.

BY MR. EDWARD MOORE.

ATTENTION was drawn some years ago by Mr. Brett to the substance sold in the shops under the name of Calamine. That gentleman stated, in a communication published in the *Medical Gazette* for April, 1837, that in all the specimens which he examined of the so-called *calamine* he found from 78 to 87 per cent. of sulphate of baryta, and only a trace of zinc. Being desirous of ascertaining whether the calamine of commerce is still such as Mr. Brett has represented it, I obtained six specimens from the most respectable drug houses in London for examination. The following are the results of the analyses:

1.	
Carbonate lime	3.6
Peroxide iron	5.2
Sulphate baryta	89.3
Water	1.9
	100.0

2.	
Carbonate lime	5.8
Peroxide iron	2.8
Sulphate baryta	85.2
Water	6.2
	100.0

3.	
Carbonate lime	5.6
Peroxide iron	3.2
Sulphate baryta	82.8
Water	8.4
	100.0

4.	
Carbonate lime	1.3
Peroxide iron	1.4
Sulphate baryta	90.8
Water	6.5
	100.0

5.	
Carbonate lime	3.0
Phosphate iron	2.8
Peroxide iron	3.7
Sulphate baryta	84.8
Water	3.7
	100.0

6.	
Silica	28.8
Oxide zinc	58.6
Carbonate lime	2.8
Phosphate iron	6.6
Water	3.2
	100.0

On reviewing the foregoing analyses it would seem probable that Nos. 1, 2, 3, and 4, are factitious articles, composed of sulphate of baryta and sesquioxide of iron, with some accidental carbonate of lime; yet from the peculiar composition of No. 5, it may happen that a mineral resembling calamine in its physical characters has been brought from the mine (whether by accident or design) for the true carbonate of zinc. No. 6 is a specimen of the electric calamine or siliceous oxide of zinc, often occurring

with pure calamine in the Derbyshire lead mines, and known by its gelatinising on the addition of hydrochloric acid.

As an article of our Pharmacopœia, calamine should claim some pretensions to purity. If pure it will be totally soluble in hydrochloric acid; any residue must be accounted an impurity. It is full time that the Chemists should resist the imposition, at present practised, and refuse to receive a specimen of calamine until it has been examined and found to be genuine.

Laboratory, 17, *Bloomsbury Square.*

OBSERVATIONS ON THE WOLVERTON WELL AND CANAL-WATER.

BY GEORGE CORFE, ESQ.

Resident Medical Officer at the Middlesex Hospital.

(*Continued from page* 36.)

The following is the substance of a report which I forwarded to the directors in London, in which I have endeavoured to explain the *modus operandi* of these waters when used as a beverage:—

The well-water of Wolverton, of which the chief part of the inhabitants drink, is proved by analysis to be a weak mineral spring; similar, though feebler in character and in component parts, to the celebrated German water at Marienbad, called the *Ferdinandsbrunnen*, to which water invalids resort from all parts of Europe.

To prove this fact it is necessary to make a comparison from an analysis of the two waters.*

WOLVERTON WELL-WATER.	MARIENBAD WATER.
Free carbonic acid.	Free carbonic acid.
Carbonate of lime, with a trace of magnesia.	Carbonate of lime with nearly an equal quantity of magnesia.
Sulphate of soda in large quantities.	Sulphate of soda in large quantities.
Sulphate of potash.	No sulphate of potash.
Chloride of sodium in large quantities.	Chloride of sodium in large quantities.
Chloride of potassium.	No chloride of potassium.
Carbonates of potash and soda.	Carbonate of soda but not of potash.
Silica.	Silica.
Oxide of iron and alumina in small quantities.	Oxide of iron and alumina in small quantities.

This comparison will appear the more striking when we glance at the analysis of good soft water. This always contains a small quantity of carbonate of lime, a still smaller proportion of chloride of sodium, and a trace only of silica, chloride of lime, sulphate of potash, and carbonate of soda, whereas we find in the Wolverton Spa, that not only are there salts totally foreign to good soft water, such as sulphates

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* That of Wolverton made by Dr. Ronalds, at my suggestion, and that of Ferdinandsbrunnen, made by Berzelius and Steinman.

of soda and potash, and carbonate of soda, with free carbonic acid, but even the ordinary salts of soft water superabound in this Spa, and three, which are not found in the Marienbad Spa, are found in distinct quantities in this water; these are, sulphate of potash, chloride of potassium, and carbonate of soda.

These proportions of solid matter in the Wolverton Spa, as compared to the *Ferdinandsbrunnen*, are nearly as six to thirty-four. The invalids who resort to Marienbad for the use of the water, are those who labour under a disordered state of the mucous membrane of the stomach and bowels, or under impaired digestion or sluggishness in the circulation of the organs of the abdomen, giving rise to congestion in them. The amount of salts in the Wolverton mineral water may appear small to those unacquainted with the character of spas in general, but it is not their minuteness of quantity *only*, which gives to the water a decided medicinal agency, but it is that natural combination of several salts in it which operate so subtlely, powerfully, and irresistibly, upon the animal economy, that all chemical or artificial means to deprive it of this action are baffled, or to quote the words of a celebrated writer on mineral waters, Dr. Franz,

"When several salts of different kinds are dissolved in pure water, as in the case of mineral springs, their latent properties are not only developed and rendered fit for operating, but a *new chemical process* is also occasioned, in which reciprocal action takes place. In whatever the said process may consist, this much appears certain, that the medicinal property peculiar to each individual salt is not lost or destroyed, but only modified, by the influence the various salts exert upon each other, whilst co-existing in solution," so that, as Dr. Struve observes, "no one ingredient is unimportant, but even the smallest proportion of one, which may appear to be of no value, has its share in the entire action."

It has come to my knowledge lately, that two persons, a physician and a lady of rank, have imprudently ventured upon taking a continental spring, the latter individual partook of the spring I now allude to, at Marienbad.

The pulse of both rose to 120, and in the instance of the lady, continues to range at that height to this day, and in the former case it remained for many months at that unnatural standard; but what was far worse in both instances, they have subsequently presented unequivocal evidences of diseased heart and lungs.

If the imprudent drinking of a glass or more of this mineral water during four or six weeks has been the cause of such permanent disturbance to the whole system, is it to be wondered at that the use of this mineral water at Wolverton, in all articles of cookery, and in the drinking it cold or hot, should produce the maladies which seem to abound in this town? In the progress of administering the Marienbad waters for the eradication of inveterate diseases of the skin, specific eruptions most commonly make their appearance, and thus the original disease is removed by the production of a new and peculiar one over the body. "In general, however, I have observed that the continued use of saline mineral waters produces critical eruptions on the skin, still more so when they are drunk warm, or belong to the class of Thermal springs."*

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* Dr. Granville's *Spas of Germany*.

In like manner also, do obstinate eruptions on the skin break out in the new settlers in the town of Wolverton, and so well known is this circumstanee, that many of the Directors are fully aware of the fact.

The majority of cases which have come under my notice for medical treatment have been females, whilst those families who reside in the streets, the houses of which are wholly supplied by well or mineral water, have presented a more inveterate character in their diseases than those in the families residing in streets supplied partly by well and partly by canal water. It is remarkable that the sufferers in the former instances have always exhibited a train of undeviating symptoms, more or less formidable, which are precisely analogous to the severe disturbance which follows the imprudent use of the Marienbad Spa. I allude to such series of symptoms as the following: vertigo; severe and protracted head-aches; palpitation; restless sleep; distressing fulness over the forehead; and sense of temporary loss of consciousness, recurring at frequent intervals through the day and week; loss of appetite, &c., and these symptoms are more or less complicated with pulmonary congestion, intestinal worms, and eruptions.

It may be asked why the greater part of the few sufferers who visit this Hospital are chiefly females and children, and why should not the men be affected in like manner? The answer to such an inquiry is that some of the men are so affected, and that not more are so, may be attributed to the labour and exertion of their daily occupation, whereby a vast quantity of these soluble salts are thrown off by means of perspiration. For example, if this mineral water was drunk by the females medicinally, at the rate at which the Marienbad Spa is taken—that is from one to three tumblers every morning—its action upon the bowels would be such that probably its injurious effects upon the system would not be so appreciable; at all events, the symptoms might not be characterized by such serious disturbance as now follows its gradual introduction into the body, and thus its sudden action upon the alimentary canal, would leave the females in some such state as the free perspiration of the labouring men in the factory leaves them, that is in a partially disturbed state of system only. But this view of the case, it may be affirmed, is only problematical; however, I would observe, it is fully borne out by the facts which are occurring in the town from week to week. I shall now advert to these facts.

The Wolverton inhabitants come from all parts of England, and are for the most part in robust health on their arrival, but their constitutions are soon unstrung by the use of this water. Persons who have gone to Wolverton with an acidulous state of stomach, may have improved somewhat in health for the first three months under the use of this alkalescent water; and although such may be here and there the fact, yet I doubt nevertheless whether it is a real improvement, considering that such water, instead of being drunk cold from the well, and taken as a natural medicine, is boiled, and throws up its scum and froth, and is thus introduced slowly into the constitution under its most deleterious form.

Another striking illustration of the pernicious tendency of this mineral water, is derived from the collateral evidence of the injurious effects of a bad or unfiltered supply of the canal water. It is a fact that the ova and subsequent propagation of intestinal worms are conveyed into the human system by means of river or surface water,

whilst this form of *entozoa* rarely occurs in man so long as he is supplied with genuine well or spring water. But when man is debarred from this character of pure beverage, and is necessitated to take river-water, however clear and wholesome it may look and taste, yet are the ova of intestinal worms conveyed thereby into the system, which even the act of boiling does not destroy. While I make these remarks, which are based upon the interesting experiments recorded by Dr. Watson in his valuable Lectures, p. 500, vol. ii., I am bound to say, that though after the boiling of the water by M. Schulze, of Berlin, that liquid, as soon as the process was stopped by which he kept out the animalculæ, was immediately filled with living infusoria; and they must either have been the vital germs of the old insects, or they must have been an immediate deposit from the atmosphere, which found a suitable nidus in the water of a river, while they recoil from such a bed as that of a healthy spring. The propagation of this parasitical disease is materially furthered by a deranged state of stomach, and debility of the organs of assimilation. Now the Wolverton inhabitants, who have suffered amongst other diseases, from worms, are those only who have been supplied with the canal water, whilst at this moment, I have not a single case where this complaint has been mixed up with other more distressing symptoms in those who have wholly partaken of the well or mineral water. But a curious fact also presents itself here too, for whilst the mineral water deranges the stomach and bowels, and aids in the production of that very state which is favourable to the development of worms, so also, whilst it is drank in combination with the canal-water, the ova in the latter fluid find a favourable nidus for their development in such weakened stomachs; the inhabitants of Cook and Walker Streets, and the North Cottages, present a striking example of this cause and effect.

On viewing the analysis which has been furnished by Dr. Ronalds, and investigating the various collections of sediments sent to me by Mr. M'Connel, the Wolverton superintendent, found in the well and tank, it would certainly appear that the well-water is peculiarly astringent, depositing a large quantity of alkaline earths, analogous in composition to "fuller's earth," and which is, in itself, a sufficient argument in favour of its injurious influence upon the animal economy, whilst, on the other hand, the composition of the canal-water is so closely allied to wholesome river-water, that, but for its unfiltered state, it might be made available for all culinary purposes. This water must undergo a certain amount of circulation with its locks, tributary streams, and surface supply, so that when properly filtered, upon the scientific principles adopted by the River Company in London, it might be rendered, at a small expense, a very wholesome beverage.

The long continued sweetness of the Thames filtered water, taken in by the shipping at Blackwall, must be familiar to the Directors of the Company.

ANALYSIS OF THE WOLVERTON WELL-WATER.

BY MR. R. W. GILES.

The peculiar effects ascribed by Mr. Corfe to the well-water at the Wolverton Station upon those who are in the habit of using it (*See* Mr. Corfe's paper in the July number of this Journal) appeared to indicate it as an interesting subject for a more rigid examination than it had yet been submitted to, more especially as the analysis published with the record of Mr. Corfe's very careful observations failed to establish that connexion of cause and effect which we should expect to find when the consequences were said to be so marked.

It will be seen by a reference to the above paper that the solid matter in a gallon of the water did not exceed 42.78 grains, which is by no means a large quantity, and is not stated to consist of anything unusual. In fact, the water from the Artesian well at the back of Trafalgar Square, contains all the ingredients of the Wolverton water in larger quantities, with the exception of carbonate of lime, and alumina not present at all, and yet no similar inconvenience has attended its use. The present examination was undertaken in order to obtain an accurate quantitative determination of each ingredient, and to compare it with other waters whose operations are well known. There are some points in which the results do not agree with the statement already given; this probably arises from the first analysis being made upon the water drawn at the refreshment-room, whereas that now examined was obtained directly from the well under circumstances favourable for procuring a fair specimen.

The refreshment-room was supposed until lately to be supplied entirely from the well; but it has been since discovered that a pipe connecting it with the canal water had been surreptitiously attached, and the water from that source is now, therefore, an indefinite mixture of the two.

WATER FROM THE WELL IN THE COMPANY'S FACTORY AT WOLVERTON.

Specific gravity 1.000669, at 60° Fahr.

Substances found.	Grains in Imperial Gallon.
Silica	.2000
Alumina	.2600
Phosphate of Iron	.5400
Carbonate of Lime	10.9600
Carbonate of Magnesia	2.3195
Chloride of Sodium	6.0030
Sulphate of Soda	14.3240
Carbonate of Soda	6.5755
Organic Matter	2.8500
	44.0320

These results are only valuable comparatively, and it is from comparing them with the analysis of other spring-waters in common use, that we must draw our conclusions.

TABLE OF THE COMPOSITION OF SOME SPRING WATERS,
Showing the quantity in grains of each constituent in an imperial gallon.

	Artesian Well Trafalgar Sq. London. (Abel and Rowney).	Well at Coombe and Delafield's Brewery. (Graham).	Wolverton Well in the Factory.	Spring Water supplied to Paris by the Arcueil Aqueduct. (Deville.)	Spring Water at Dijon. Suzon. (Deville.)
Silica	.971	.44	.2000	2.146	1.065
Alumina	...	...	.2600	.371	.070
Phosphate Iron	...	.24	.5400		
Carbonate Lime	3.255	6.18	10.9600	12.958	16.133
" Magnesia	2.254	1.08	2.3195	.575	.266
Sulphate Lime	...	...	...	11.490	
Chloride Magnesium	...	...	...	1.163	
" Sodium	20.058	12.74	6.0030	2.637	.224
Sulphate Soda	8.749	24.25	14.3240	.378	.189
" Potash	13.671	...	...	1.410	
Carbonate Soda	18.048	11.68	6.5755	...	.147
Nitrate Potash	...	...	...	...	.189
" Magnesia	...	...	...	3.998	
Phosphate Lime	.034	.19			
" Soda	.291				
Organic Matter	.908	...	2.8500		
	68.239	56.80	44.0320	37.126	18.283

It is impossible, with the above table before us, to come to any conclusion unfavourable to the Wolverton well-water without at the same time condemning in a superior degree the well-esteemed deep well waters of London; it proves that, far from containing saline matter to an extent to render it unfit for drinking, its solid contents are slightly under the average of the other four; and although it has been said of the waters of Paris, which contain even a smaller proportion, that they exercise a distinct purgative effect upon strangers, yet this has been always ascribed to the large quantity of sulphate of lime present, from which the Wolverton water is free.

Subjoined is a table of the composition of river waters representing the quantities in troy grains of solid ingredients in 70,000 grains, or an imperial gallon, from each of the sources indicated. The table has been compiled from different sources, and represents analyses recently made. Those relating to foreign waters are expressed in English weights which have been calculated from the foreign.

Laboratory, 17, *Bloomsbury Square.*

COMPOSITION OF RIVER WATERS ;

Representing the quantities in Troy grains of solid ingredients in 70,000 grains, or an imperial gallon of water, from each of the sources indicated.

	THAMES. 14 Miles above London Bridge. (G. F. Clark.)	CLYDE, at Glasgow.	LEVEN, a Tributary to the Clyde.	SEINE.	RHINE.	GARONNE.	RHONE.	LOIRE.	DOUBS.
		Dr. Penny.		M. H. Sainte-Claire Deville (*Ann. de Chim. et de Phys. Mai*, 1848.)					
Silica	.273	28	.32	1.711	3.423	2.813	1.669	2.848	1.114
Alumina	a trace			.035	.175	...	.303	.498	.147
Oxide Iron	a trace	a trace	...	.175	.406	.217	...	.385	.210
Carbonate Lime	12.759	2.52	.5	11.609	9.511	4.524	5.534	3.374	13.397
Carbonate Magnesia	1.027	.72	...	.189	.350	.238	.343	.427	.161
" Manganese	...	...	...	...	...	.210			
Sulphate Lime	.450	.26	.52	1.886	1.030				
" Magnesia	...	...	a trace	...					
Chloride Magnesium	...	.4	.66		...	...	...	...	.035
" Calcium	1.750								
" Sodium	...	.54	.73	.862	.140	.224	.119	.336	.161
Carbonate Soda	...	...	...	...	...	.455	...	1.023	
Sulphate Soda	2.000	1.94	.39	...	.946	.371	.519	.238	.357
" Potash	.667			.350	...	.533			
Nitrate Potash	...	...	...	...	.266	...	.280	...	.287
" Soda	...	...	...	.659	...	...	.315	...	.273
" Magnesia	...	...	...	.364					
Silicate Potash	...	...	...	...	...	...	...	.308	
Earthy Phosphates	...	.31	.18						
Phosphoric Acid	a trace								
Organic Matter	3.480	.89	.45						
	22.406	7.86	3.75	17.840	16.247	9.585	9.082	9.437	16.142

NOTE ON THE BOILING AND DISTILLATION OF LIQUIDS IN GLASS VESSELS.

BY MR. THEOPHILUS REDWOOD,

Professor of Chemistry and Pharmacy to the Pharmaceutical Society.

In a communication made to the Pharmaceutical Society about two years ago, "On the influence of Cohesion and Adhesion on the boiling and evaporation of Liquids," and which was published in this journal, vol. vi., page 119, I alluded to some cases in which it is found difficult to effect the distillation of liquids in glass vessels. This difficulty arises from the occurrence, in certain liquids, of the phenomenon commonly called *bumping*. It is frequently experienced in the process for preparing the *diluted hydrocyanic acid* of the London Pharmacopœia, and to a much greater extent in distilling oils and resins with spirit or water. My attention was more particularly directed to the subject in connexion with a series of investigations I had occasion to make with the view of determining the quality of some specimens of *balsam of copaiba*. Some of the results of these investigations are published in the journal, vol. vi., page 13. In attempting to effect the separation of the essential oil from the resin of the oleo-resinous balsam, by distilling it with water in a glass retort or flask, I found it impossible to continue the distillation for a sufficient length of time to complete the analysis, in consequence of the bumping which took place, and which became more and more violent as the process proceeded.

On repeating the experiments with other oils and resins, similar phenomena were found to occur. Thus, for instance, if a piece of common resin or of shellac be introduced into a globular flask nearly filled with distilled water, and if the water be boiled over the flame of a gas lamp, the ebullition will at first take place pretty uniformly; but after some time it will be observed that the bubbles of steam which are formed at the bottom of the flask, in contact with the most heated part of the glass, will be larger than they were in the first instance; and instead of their passing continuously through the liquid, there will be frequent intermissions, during which ebullition will entirely cease. After each of these intermissions the disengagement of steam will take place with increased violence, and as the process is continued, the length of the intermissions will become greater. If a thermometer be introduced into the flask, it will be found that this irregularity of ebullition is accompanied by great variations of temperature. While the bubbles of steam are passing freely through the liquid, the temperature will be from 212° to 214° Fahr., but when a cessation of ebullition takes place, the temperature will rise, and will sometimes reach 220°. This will be followed by a sudden and violent evolu-

tion of steam, constituting the phenomenon of *bumping*, by which the accumulated heat is disengaged, and the temperature of the liquid reduced again to its usual boiling-point. The violence of these explosions will, after some time, become so great as to cause the projection of a considerable part of the liquid, at once out of the flask, endangering in no slight degree the safety of the operator. This may be taken as a forcible illustration of the phenomena which accompany the bumping of certain liquids when boiled in glass vessels ; but the effects are seldom so marked as in this case.

Several attempts have been made to explain these phenomena, but without much success. They have been ascribed to a modification of the forces of *cohesion* and *adhesion* in the liquid, caused by the expulsion of atmospheric air during the process of ebullition ; Donné having shown that some liquids acquire greatly increased cohesive and adhesive force when air is wholly excluded from them. It may, indeed, be readily admitted that the immediate cause of the bumping of liquids is some modification of the forces of cohesion and adhesion ; but that this condition is induced simply by the expulsion of air, is a position that will not be so readily assented to.

The effect appears to depend, partly on the condition of the liquid in which it occurs, and partly on that of the vessel containing the liquid.

It was found by Marcet, and I have repeatedly verified the results, that if pure water be put into a glass flask, which has previously had *oil of vitriol* heated in it, the boiling-point of the water will sometimes rise as high as 220° ; while, on the other hand, if the inner surface of the flask be coated with a thin film of *shellac*, the boiling-point of pure water heated in it will be sensibly below 212°. In a metallic vessel the same liquid would boil precisely at 212°, and in a glass vessel, in its usual condition, without any previous preparation, the boiling-point would be a little above 212°. In these cases the boiling-point of the liquid appears to have some relation to the condition of the surface of the containing vessel, and to be unconnected with the presence or absence of air in the liquid.

There are other cases, as already shown, in which certain substances, dissolved or suspended in the liquid, occasion variations in the boiling-point as great as those noticed by Marcet. Some salts, and especially resins and oils, belong to this class ; and it is worthy of remark that the same substance, *shellac* for instance, when spread over the surface of the glass, produces an effect the opposite of that which occurs when it is merely suspended in the liquid. In the one case the boiling-point is reduced, while in the other it is raised to the extent of seven or eight degrees. But these variations, caused by the presence of substances dissolved or suspended in the liquid, do not occur in metallic vessels. The

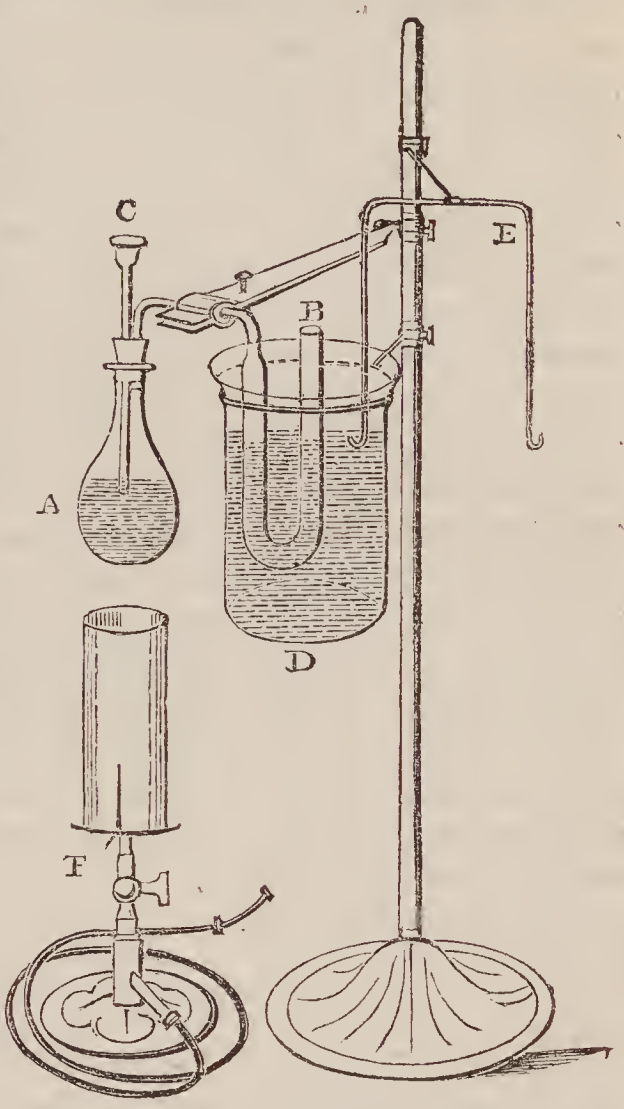
water containing shellac, which boils at 220° in a glass flask, if put into a metallic vessel will boil steadily at 212°, without the slightest tendency to bumping. Indeed, I have invariably found that liquids, the ebullition of which, in glass vessels, is accompanied by even the most violent bumping, present no such phenomenon when boiled in metallic vessels.

The effects which I have observed in a great number of cases have suggested the probability of their being connected with the electrical condition of the liquid operated upon, and of the vessel containing it. It is not my purpose, however, on the present occasion, to enter into any details with the view of explaining the cause of these phenomena, but to describe the means by which their occurrence may be prevented, and, moreover, to describe an arrangement of apparatus which I have found convenient for effecting the distillation of small quantities of *balsam of copaiba*.

Having observed that liquids, which are subject to bumping when boiled in vessels of glass, present no such effect if the process be conducted in those made of metal, I thought it probable that by coating the inner surface of the glass with silver, in the manner adopted by Mr. Drayton, the irregularity of ebullition alluded to would be prevented. This I have found to be the case, and I have repeatedly used glass flasks coated on the inside with silver, for the distillation of balsam of copaiba, without experiencing inconvenience from the bumping of the liquid. The method I have adopted for preparing the flasks has been to throw down the silver by Drayton's process, so as to cover the lower part of the vessel, while the upper parts are left unsilvered. This is effected by introducing as much of the ammoniacal solution of silver as will cover the part to be coated. After the silver has been deposited by the addition of the essential oils, it is necessary to clean the flask from adhering oil by means of rectified spirit, several successive quantities of which should be boiled in it until the silver becomes perfectly clean and bright, and no smell of the oil remains. When the process has been successfully performed, and every trace of oil removed, the coating of silver may be rendered thicker by depositing a fresh portion of metal, from a solution of oxide of silver in cyanide of potassium, by electricity.

Glass vessels may also be covered with platinum, by putting into them a solution of the chloride of that metal, adding thereto some *formic acid*, and then boiling the mixture. The coating of metallic platinum thus obtained, will not, generally, be so perfect and uniform as that of the silver deposited by the preceding process; but I have frequently succeeded in getting a deposit of perfectly bright platinum in this way, which has adhered very strongly to the glass, and has not been separated by the action of strong acids and other substances repeatedly boiled in the vessel.

The arrangement of apparatus which I have adopted and found convenient, in examining specimens of balsam of copaiba, and in other similar cases, is represented by the annexed engraving. It consists of a flask A, through the cork of which a tube-funnel C passes, for the supply of fresh liquid, if required: a bent tube B, which forms the receiver; and a beaker D, nearly filled with cold water, by which the condensation is effected. The tube B, being inserted through the cork of the flask, is supported by the *Gay-Lussac holder*, and immersed in the contents of the beaker, which is placed in one of the rings of the retort stand. The syphon E, is used for removing the water heated in the process of condensation, from the upper part of the beaker, when cold water is from time to time poured in through a tube-funnel reaching to the bottom. This syphon may also be employed for withdrawing the condensed liquor from the tube B. It possesses the advantage of remaining always charged, the liquid being retained within the tube in consequence of the form given to the ends of it, while a current is established when the surface of the liquid into which one end is immersed stands higher than the open extremity of the other end.



The bottom of the flask being coated with silver, in the manner described, the distillation of balsam of copaiba with water may be continued in this apparatus until volatile oil ceases to pass over, fresh portions of water being added from time to time through the tube-funnel, and the distilled product which collects in the receiver B, being occasionally removed by means of the syphon.

The introduction of pieces of platinum wire or clippings into the flask or retort has been recommended for preventing irregularity of ebullition in some liquids, especially in the distillation of *oil of vitriol*; but I have not found this to be a complete remedy for the evil alluded to in any case, and in most cases it appears to be of no use.

A French Chemist, M. Lambert, has proposed the employment of fragments of a species of quartz (*quarzite*), which are to be introduced into the glass retort, in the distillation of oil of vitriol. It is stated that the presence of a few angular pieces of this substance in the retort will render the distillation of several pounds of the acid quite manageable and easy. I have not been able to ascertain with certainty what mineral is referred to by the name of *quarzite*, but I find that fragments of *rock crystal* produce the effect indicated remarkably well. Pieces of rock crystal suitable for this purpose, consisting of the chippings formed in making spectacle-glasses, may be obtained at a lapidary's or optician's. In all cases of irregular ebullition in which I have tried the use of this substance, it has proved completely successful. The effect of introducing five or six pieces of the rock crystal into a liquid, such as the mixture of balsam of copaiba and water, which cannot be distilled alone in a glass vessel, is most marked and satisfactory; the irregularity of ebullition instantly ceases, and the process may be continued for any length of time without a return of the bumping. This is certainly the most simple and easy method of preventing the evil alluded to.

It might be supposed that broken fragments of glass or sand would answer the same purpose as rock crystal; but such I have not found to be the case.

17, *Bloomsbury Square.*

ARTIFICIAL SKIN.

BY CHARLES BLACHFORD MANSFIELD, ESQ.

In a recent number of your Journal appeared a notice of the applicability of *gutta percha*, by means of its solution in bisulphuret of carbon, to the formation of an artificial skin or plaster. Perhaps the unpleasant odour and extreme volatility of this solvent may assist its somewhat high price in excluding it from general adoption for this purpose.* A substance therefore, possessing all those properties of the sulpho-carbon which fit it for this application, and not liable to any of the above mentioned objections, may not be unacceptable, and the value of the suggestion may be increased by the statement that the solvent here introduced has been successfully employed for some time, long before the publication of the similar use of the fluid first alluded to; it is probable, indeed, that it was the first vehicle by which gutta percha was ever converted into cuticle.

It is well known that the varieties of caoutchouc are readily soluble in numerous hydrocarbons. Oil of turpentine and common coal naphtha have been much used for dissolving them. Neither of these oils, however, nor any other hydrocarbon of commerce, is sufficiently volatile to enable a varnish of the solution to dry rapidly, and so com-

* The latter drawback may be attached equally to chloroform, which has been more recently mentioned as adapted to the same use.

pletely as to leave a film of the gum, with properties unchanged, upon the surface to which it was applied; a portion of such solvents is obstinately retained by the deposit, which is thereby deprived of the characteristic toughness or elasticity of the original gums.

The solvent for gutta percha and India-rubber which is here proposed, is the very volatile hydrocarbon *benzole*, which may be obtained from coal tar or from coal naphtha, by rectifying the most volatile portions, and reserving that part which distils over at temperatures below 200° or 212° Fahr. For precise details as to the best methods of preparing this fluid, I must refer your readers to a future number of the *Journal of the Chemical Society* (to whom a paper descriptive of it was read some time ago) or to a certain prolix document in parchment preserved in the Enrolment Office in Chancery Lane.

This fluid readily dissolves gutta percha in any quantity, especially with the aid of warmth, forming a compound with it more or less fluid, according to the quantity of the solid held in solution. It dissolves caoutchouc, though not quite so easily as its non-elastic congener. Its boiling point is the same as that of alcohol, which places it in volatility far above oil of turpentine and common coal naphtha, yet just so far below ether and the bisulphuret of carbon, as to render it conveniently manageable in practice. The solution of the mixed gums, or either of them alone, in benzole, being spread on any surface, the fluid hydrocarbon quickly evaporates, and leaves the solid in the form of a membrane, the strength of which may be nicely regulated from extreme tenuity to any required degree of thickness. If the surface to which it is applied be smooth, the membrane may be peeled off, and will retain the form of the object, or if the surface be rough, it will adhere firmly. Thus being spread on the skin, it forms a perfect artificial cuticle, admirably adapted for protecting the natural surface in case of cutaneous disease, wounds, burns, &c. The accompanying note, with which Mr. Shaw, Surgeon to the Middlesex Hospital, has kindly favoured me, is, however, more to the point than a bare statement of possibilities :—

25, *Henrietta Street, Cavendish Square,*
June 26th, 1848.

My dear Sir,—It was about the end of the autumn of last year that you were so good as to supply me with some of your solution of gutta percha, and explained to me the uses to which you thought it applicable in surgery. I immediately made trial of it, and have frequently used it since that time.

I have applied it in fresh cuts of the hand, on excoriations and grazings of the skin from various causes, on recent scalds when slight, on ulcerated surfaces after burns, on sores of the leg, some of them irritable, on herpetic and other kinds of eruptions, on superficial cancerous ulcerations, and I am satisfied that it is a mild and safe application. In several of the cases it has afforded decided relief by acting like an artificial scarf skin, and protecting the painful surface. When applied to a sore from which there is much discharge of matter, the thin membrane soon becomes detached, and the pus finds its way out by small rents or holes. Although I cannot say that in these cases the application has been of service, yet it has never been prejudicial to the healing of the sore.

I will add that it is very manageable. It is put on by means of a camel's hair brush, one coat being allowed to set or dry (which it does in less than a minute) before another is applied, and the process is repeated till the

membrane is of proper thickness. On putting on the first layer, there is, of course, a little pain, but it is chiefly from the contact of the brush, the fluid itself causing only a slight sensation of heat: after the first layer has set, the others are laid on without pain.

If it be desirable to remove the membrane, it can be easily detached, by covering it with a poultice or water dressing.

I remain, very truly yours,

ALEXANDER SHAW.

CHAS. B. MANSFIELD, Esq.

The solution to which reference is made in the above note, is one of gutta percha in benzole. It should be stated that for application to parts subject to much flexure or friction, a solution of India-rubber is preferable to one of gutta percha, the elasticity of the caoutchouc enabling it to yield without cracking to movements which will destroy the continuity of a membrane of the latter substance.

By spreading the solutions on suitable polished surfaces, membranous textures of any size or form may be produced, such as bladders, or waterproof cloaks, which may be carried in the waistcoat pocket. Articles which are destructible by air and moisture, may be preserved by being covered with a varnish of the impervious material.

An admirable application of the solution of gutta percha in benzole has been discovered by Mr. Johnson, Secretary of the College of Chemistry, who permits me to take this opportunity of making it known. If the solution be spread on a surface of plaster of Paris or other finely porous material, it confers upon the surface the property of retaining a coating of plumbago powder in close adhesion, so as to render it electro-conductile. The solution neither remains on the outside of the substance so as to form a new surface, nor soaks deeply into it, as does melted wax, but remains exactly at the original surface, which is therefore not overlaid by an additional coating, but is merely altered in texture. By thus treating some plaster casts, Mr. Johnson has converted them with the process of electro-plating, into beautiful objects of metallurgic art.

This fluid, benzole, has many other remarkable properties, with which, however, I will not now occupy your space. Let it, however, be mentioned, as connected with Pharmacy, that the vapour of it inhaled, will, like other volatile spirits containing little oxygen, and more effectually than most of them, produce a state of anæsthetic intoxication which may give it a value with those who think that drugs offer the safest means of quenching the pains of surgery.

Regent Street, London, July 20, 1848.

ON SOLUTIONS OF GUN-COTTON, GUTTA PERCHA, AND CAOUTCHOUC, AS DRESSINGS FOR WOUNDS, &c.

BY PROFESSOR SIMPSON.

AT different periods in the history of Surgery, very different practices have prevailed in regard to the treatment of wounds. At one time, in injuries or incisions of any great extent, the whole sides of the divided or cut surfaces were dressed as separate and distinct wounds; and all chance of immediate union prevented. Slow re-union by suppuration and granulation, or, as the old surgeons termed it, by "digesting, mundifying, and incarning" wounds,

was alone attempted. Afterwards, however, and yet not without much doubt and opposition,* the practice was introduced of placing, from the first, the sides and lips of the wound in contact, and thus allowing nature to produce the spontaneous adhesion of the whole wound, or as much of its surfaces as will thus adhere. In other words, re-union by the first intention came to be more and more attempted *after* the discovery of the doctrine of adhesion (as it was termed) was duly made and fully acted on.

But no small difference of opinion and practice has prevailed as to the best mode of bringing and retaining in contact the sides of such wounds as are capable of healing by the first intention. A great variety of bandages, plasters, needles, and stitches have been invented for this purpose. And, the propriety or non-propriety of using sutures in preference to plasters (the *sutura cruenta*, as it was termed, in preference to the *sutura sicca*), was at one time a special subject of dispute. Louis, Pibrac, and Young maintained that in all, or in almost all cases, the employment of the suture should be abandoned as irritating and hurtful. At the present day, both modes of artificial re-union—the *sutura cruenta* and *sicca*—are followed by the generality of surgeons; and often both modes are used simultaneously.

It seems not at all improbable, that another step in advance will betimes be effected, and that surgeons will be enabled to apply to the wound, after its edges are brought in contact, some material or other which, like an artificial plasma, or lute of coagulable lymph, will at one and the same time serve the following purposes :—

1. It will be sufficiently strong and adhesive to retain the edges of the wound together, without the irritation sometimes following the use and removal of sutures or pins.

2. It will serve as a perfect dressing to the wound.

3. It will, however, not be soluble in water or be easily removed, and hence will enable the surgeon to apply cold, &c., to restrain and modify the action in the wound, if required.

4. Though insoluble in water, the material used must be soluble in some menstruum that is easily and readily vaporized.

5. It will be applied in a fluid or semifluid form, and be thus capable of adapting itself to any irregularity in the edges of the wound or in the neighbouring cutaneous surface; the fluid part evaporating speedily on exposure; —and a solid tissue or substance possessing sufficient tenacity, adhesiveness, and insolubility in water for the above purposes, being left like a plaster on the edges of the united wound.

The intention of the present imperfect communication is to bring before the Society some of the attempts lately made in order to attain the above objects.

Two or three weeks ago, it was announced in our weekly medical journals that a solution of gun-cotton in ether had been used in America as a dressing for wounds; and, within the last two or three days, the American journals which have arrived in Edinburgh, show that the suggestion of this practice is claimed by two different persons, viz., by Mr. Maynard, a medical student of Boston, and by Dr. Bigelow of the same city.

Soon after the discovery of gun-cotton or pyroxyline, Schoenbein and Boettger showed that acetic ether was one of its best solvents.—(*Chemical Gazette* for April 1, 1847.) Richner had ascertained that it was entirely

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* "I would ask (gravely writes O'Halloyan in 1765), I would ask the most ignorant in our profession, whether he ever saw or heard even of a wound, though no more than one inch long, united in so short a time (as three days). These tales are told with more confidence than veracity; healing by inosculation, by the first intention, by immediate coalescence without suppuration, is merely chimerical, and opposite to the rules of nature."

soluble in the acetic ethers both of alcohol and wood spirit.—(*Ib.* for Feb. 1.) When xyloidine, or the analogous compound made by the action of nitric acid on starch, is dissolved in ether, or ether and alcohol, Schoenbein found that it was reduced to a colourless gelatinous mass, and that, if spread upon a smooth surface, "*it left a dull white opaque membrane.*"—(*Ib.* for April 1.) I am not aware whether he has recorded any similar observation regarding the ethereal solution of pyroxyline ; but it is this quality of it that has been turned in America to practical purposes as an application and dressing for wounds.

When gun-cotton is fully dissolved in strong sulphuric ether, it forms a semi-transparent gelatinous pulp. When a layer of this is laid on any surface, the ether speedily evaporates, and leaves an adherent whitish cotton-like web, which contracts strongly as it dries; and possesses still all the usual inflammable and explosive properties of gun-cotton. In a great variety of trials which I have had made as to the best mode of forming the solution, I have met with very various results. Many of these variations were probably owing to imperfections and differences, either in the quality of the gun-cotton or of the ether. But occasionally, with the same ingredients, the quality of the solution seemed liable to differ. Sometimes after the gun-cotton had been immersed in the ether for ten or twelve hours without much effect, the addition of a little strong spirit immediately effected a perfect solution. The gun-cotton often possesses strong adhesive properties when used before it is all completely dissolved. In using as a solvent, aldehyde, which had been kept for a considerable time, I found a perfect pulpy solution formed in a few minutes. If it could be used as a menstruum it would possess the advantage of being even more vaporizable than ether. But in trying to repeat the experiment with some aldehyde newly formed for the purpose, the same results were not obtained.

Usually an ounce of strong sulphuric ether will dissolve thirty grains or more of gun-cotton in the course of a few hours. But, to form a complete pulp, it will in general require to stand for a day. The advantages which the ethereal solution of gun-cotton seems to possess as a dressing for wounds, and particularly for those which it is desired to unite by the first intention, are stated in the following terms by Dr. Bigelow :—

"1st. By its powerful contraction upon evaporation, it places the edges of an incised wound in much more intimate contact than is obtained by sutures and adhesive cloth—unites them by equal pressure throughout the whole extent of the wound, and maintains them immoveably fixed.—2d. It preserves the wound perfectly from contact with air, being impermeable to the atmosphere, while its adhesion to the skin is so intimate as to preclude the possibility of air entering beneath the edges.—3d. The substance remaining in contact with the skin and wound after the evaporation of the ether, seems to be entirely inert, so far as any irritating property is concerned, and this can scarcely be said of any resinous adhesive cloth or preparation.—4th. It does away with the necessity for sutures in incised wounds of almost any extent.—5th. It is sure to remain in intimate contact with the skin till union is complete, and being quite impervious to water, and presenting a polished surface, it allows the surrounding parts to be washed without regard to the wound or dressing.—6th. It is colourless and transparent, thus permitting the surgeon to witness all that goes on beneath, without involving the necessity for its removal.—7th. No heat is necessary for its application, and the presence of any moderate degree of cold is only objectionable in retarding the evaporation of the ether.—8th. It may be made at a trifling cost ; an ounce phial, intrinsically worth little, being sufficient for a great number of dressings."

The adhesive power of this solution of gun-cotton is, when it is properly made and applied, certainly very great. In evidence of its strong adhesive

powers, Mr. Maynard states the following experiments :—" He glued a strap of sheepskin to the hand by a thin layer of the solution, nine lines long and one and a half wide, and it sustained a weight of two pounds. A second strap, attached to the hand by a layer of the substance, nine lines in length and three in width, sustained a weight of three. A third strap, fixed to the hand by a layer of the liquid, twelve lines square, resisted the force of ten pounds without giving way ; and a fourth strap of the leather, glued to the hand by a stratum of the solution, measuring one and three-fourths of an inch in length, and one in width, was not separated from its attachment by the gravity of twenty pounds!" These statements, says Mr. Maynard, may appear incredible, but they are founded on exact and carefully performed experiments.

As to the mode of applying the ethereal solution of gun-cotton, Mr. Maynard states, that " In slight cuts a moderately thick coating of the solution laid over the incised parts, was, on becoming dry, sufficient to keep the lips of the wound in position till union took place ; but in most instances it was employed in conjunction with straps of cotton and sheepskin, and with raw cotton, forming with them strong, unyielding, adhesive straps, bandages, and encasements ; and after many experiments, I am convinced that this is the best and most effectual way in which it can be employed as an adhesive agent in surgery. The solution dries rapidly, and in a few seconds, by the evaporation of the ether it contains, it becomes solid and impermeable to water ; and a strap moistened with it, and glued to any part of the cutaneous surface, adheres to it with a tenacity that is truly surprising." Mr. Maynard mentions one case in which, after the removal of a tumour from the scalp, the hair in the neighbourhood was shaved, and two pieces of sheepskin were firmly sealed, by the solution of gun-cotton, to each side of the wound at a distance from the edges, and then these edges were approximated and retained in contact by passing stitches through the dead sheepskin instead of passing sutures through the living tissues of the walls of the wound.

Dr. Bigelow's directions for applying the gun-cotton solution are as follows :—" For straight incisions of *whatever length*, provided the edges can be brought together without great difficulty, it is better to apply the solution in immediate contact with the skin, as follows :—The bleeding should be arrested, and the skin thoroughly dried. If the lips of the wound are themselves in contact, the surgeon has only to apply a coating of the solution lengthwise over the approximated edges by means of a camel's-hair pencil, leaving it untouched after the brush has once passed over it till it is dry, during, perhaps, ten or twenty seconds. This first film will of itself have confined the edges together ; but in order to increase the firmness of the support, more must then be applied in the same manner, allowing it to extend on either side of the incision a half an inch or more. If, however, the wound gapes, an assistant is required to bring the edges in contact, and retain them so whilst the application is made. If the incision is so long that the assistant cannot place the edges in apposition throughout the whole extent, begin by covering a small portion at the upper end, and apply the solution to the lower parts as fast as it becomes dry above. In this case, something more than the film which is left adherent to the skin will be necessary for a safe and proper support to the wound, which may have a tendency to separate. The transparency of the dressing may be still maintained by adapting a piece of goldbeater's skin or oiled silk to the wound. This should be covered with the solution, and the membrane applied after the coating is on and already contracted. A dossil of lint, or a strip of cloth, or even a piece of tissue-paper, which is thus rendered tough and waterproof, will answer the same purpose, though not transparent. Where there is much separation, it is better to fortify the wound in this way at once, and as fast as the first coating is applied and dry. If, however, adhesion by first

intention be not desired, the gum may be painted on in transverse strips, like adhesive cloth, letting the first strip dry, and giving it the goldbeater's skin support before the second is applied. Thus room is left for the escape of pus, and the exposed portion may be watched without removing the strips."

It has been proposed to use the ethereal solution of gun-cotton for other purposes than the dressing and union of wounds; as, for example, as a substitute for the starch bandage in fractures—as an application and dressing to ulcers, &c. In abrasions, and slight injuries of the skin about the fingers, it forms an excellent and most adhesive dressing. There is one extremely painful and unmanageable form of ulcer in which I applied it eight or ten days ago, at the Maternity Hospital, with perfect success. I allude to fissures at the base of the nipple. Most practitioners know well the agony that some mothers undergo, in consequence of this apparently slight disease; the ulcer or fissure being renewed and torn open with each application of the child. In two such cases I united the edges of the fissures, and covered them over with the solution of gun-cotton, making the layer pretty strong. It acted successfully, by maintaining the edges so firmly together that they were not again re-opened by the infant; the gun-cotton dressing was not like other dressings, affected by the moisture of the child's mouth;—and as a dressing, and at the same time by securing rest to the part, it allowed complete adhesion and cicatrization speedily to take place.

In a case in which Professor Miller lately removed a large portion of necrosed bone from the lower jaw, I dressed the lips of the incision with the gun-cotton solution, and it held them for some days subsequently accurately in contact till adhesion took place. In two minor amputations (one of the finger and the other of the toe) by the same gentleman, it was applied, but required to be removed in a day or two, in consequence of it retaining the discharges.

I have made a number of experiments with solutions in different menstrua, of various other substances besides gun-cotton, especially viscine, dextrine, caoutchouc, and gutta percha.

Gutta percha readily, I find, dissolves in chloroform. When a thin layer of this solution is spread upon the skin or any other surface, the chloroform rapidly evaporates, and leaves a film or web of gutta percha, possessing all the tenacity and other properties of that substance. A layer of it, of the thickness of good writing paper, has perhaps as much strength and tenacity as to hold the edges of a wound together, with all the required firmness and strength of sutures. When a film of it is placed upon the skin, and is allowed to dry thoroughly for a few minutes, the subsequent attempt to separate it is like peeling and tearing off the epidermis after erysipelas, &c. It then forms, as it were, at once a kind of artificial tissue, epidermis, or skin, which adheres strongly for a time. There is one disadvantage pertaining to it—in the course of a day or two it generally dries and crisps up, like court plaster, at its edges. If we could either increase its adhesiveness, or destroy its tendency to dry and crisp, we would render it more useful. I have seen the addition of a little caoutchouc apparently correct it in these respects.

The deposit, or "plaster" left by the solution of gutta percha is far more equable, smooth, and skin-like than that left by the solution of gun-cotton.

A solution of caoutchouc in bisulphuret of carbon, ether, or chloroform, leaves a very thin, but perhaps less regular web, and one which stretches too readily for most practical purposes.

One great deficit in this class of dressings is the want of a menstruum sufficiently powerful, and, at the same time, not stimulating like ether or chloroform. This objection may, perhaps, in practice be got over, by applying an unstimulating solution of isinglass or the like, to the raw surface, before applying the stimulating solution of the gun-cotton or gutta percha.

Or the first layer of gun-cotton or gutta percha may be made very thin, so as to evaporate almost instantaneously, and then afterwards a series of superincumbent layers may be added till the web is of the required strength. Other better substances for solution may, perhaps, be found; but no material has a chance of succeeding unless it be insoluble in water after it is consolidated, and unless it be sufficiently strong in its texture, and possesses powerful adhesive properties.

[A variety of specimens, showing the kind of artificial tissue made by the above and other solutions, was shown by Dr. Simpson to the Medico-Chirurgical Society of Edinburgh.]—*Monthly Journal.*

THE BARK OF THE ADANSONIA DIGITATA, OR BAOBAB TREE, A SUBSTITUTE FOR CINCHONA BARK.

BY DR. DUCHASSAING.

Attempts have been made at different periods to find substitutes for the cinchona barks and the alkaloids obtained from them, as the use of these substances in medicine is not unattended with inconvenience. Among the inconveniences which apply to the use of the cinchonas, are, the bitter taste of their active principles, and the scarcity and consequent high price of the barks; moreover, when administered in large doses, their anti-periodic effects are often accompanied by considerable derangement of the system.

Dr. Duchassaing, in a paper published in the *Journal de Pharmacie* for June, has directed attention to the bark of the *Adansonia digitata*, or *Baobab tree*, as a valuable remedy for fevers, and capable of replacing the cinchonas.

This tree is a native of Senegal. It is placed by De Candolle in the natural order *Bombaceæ*. It is a tree of moderate elevation, but whose trunk is of vast thickness, having a diameter of twenty or thirty feet. The fruit, called *monkey's bread*, is acidulous, and is used by the natives in pulmonary affections, and as a common article of food.

The bark, which is the part now recommended to be used medicinally, is mucilaginous, but has scarcely any taste or smell.

Dr. Duchassaing recommends its administration in the form of decoction, made by boiling half an ounce of the bark in one pint of water, until reduced to two-thirds. This decoction is transparent, of a reddish colour, and has a smell slightly resembling that of decoction of cinchona bark. It contains a large quantity of mucilage, and has but little taste. When sweetened with sugar, it is not at all disagreeable.

The principal inconvenience attending this form of administration, is, that the decoction soon undergoes decomposition. This may, to a certain extent be prevented, by adding a small quantity of sulphuric acid, which precipitates the mucilage, or by the addition of spirit.

According to Dr. Duchassaing, this remedy produces no appreciable disturbance to the nervous system. In some cases he has observed that it renders the pulse rather less frequent. It improves the appetite, and causes a determination to the skin.

In a great number of cases in which it has been applied as a remedy for intermittent fevers, it has proved eminently serviceable.

ON THE REMOVAL OF ACIDITY FROM RHINE WINES.

BY LIEBIG.

According to Liebig, neutral tartrate of potash is capable of depriving old wines of their free acid, without impairing their flavour. If to 100 parts of a liquid which contains one part by weight of free acid, one and a half parts by weight of neutral tartrate of potash be added, two parts by weight of crystallized bitartrate of potash, separate at a temperature of 18 or 19°, whilst the liquid dissolves half a part by weight of bitartrate, which contains only 0.2 parts by weight of the original free acid, consequently 0.8 of free acid is separated. If the liquid which contained the free acid, were saturated with bitartrate, then the entire excess of the free acid would have been completely separated by the tartrate of potash which was added.

Now as old wines are saturated with bitartrate of potash, a fresh addition of neutral tartrate of potash must remove all free acid. The free acid of the wine can certainly be neutralized by alkalies and alkaline earths, but none of these are equal to tartrate of potash. On the Rhine, a solution of potashes is frequently employed, by which the wine becomes richer in salts, and the acids are neutralized, but remain in the solution. If the acid be destroyed by lime, the wine acquires a lime flavour, which is easily perceived by connoisseurs. By the effect of alkalies and lime, a combination is destroyed, which contributes essentially to the flavour of the wine, whilst a neutral salt, like tartrate of potash, has not the least effect upon the combinations contained in the wines. In employing the neutral tartrate of potash with a wine of 1811, a considerable improvement of the latter was effected. After the addition of seven grains of pure tartrate of potash to one Hessian pint (2 litres) a quantity of bitartrate of potash separated, and eight days afterwards, the wine was in flavour and mildness equal to a southern wine, without having lost any of those peculiar qualities which characterize the Rhine wines.

In the autumn of 1846, many wine growers had an opportunity of satisfying themselves of the great improvement of the wine, by adding to the *must* before the fermentation begins, 6 to 10 per cent. of sugar. An addition of sugar is in bad wine years the only means by which a drinkable wine can be obtained from the *must*. By the addition of sugar, no other constituent of the wine but the alcohol is increased; the sugar does not affect the difference which exists between wines grown in different districts. The following table from Geiger will show that the proportion of spirit of wine does not alone constitute the value of the wine. In 100 parts of wine of the year 1822, Geiger found

	Spec. grav.	Absol. alcohol		Dry residue.
Steinberg, Riesling	1.0025	..... 10.87	.....	9.94
Rüdesheim Riesling, Orleans	1.0025	..... 12.65	.....	5.39
Markobrunn Riesling ...	0.9985	..... 11.60	.....	5.10
Geisenheim	0.9935	.... . 12.60	.... .	3.05
Dienheim	0.9925	..... 9.84	.....	2.18
Weinheim Hubberg, Riesling	0.9925	..... 11.70	.....	2.27
Worms, Liebfrauenmilch Riesling	0.9930	..... 10.62	.....	not determined
Bingen ..... Scharlachberg Riesling	not determined	... 12.10	After Geromont. ...	not determined
Eisler, Kleiberger, and Riesling		... 11.90		
Wiesbaden Neroberg Riesling.....	0.9950	..... 10.83	.....	2.78
Wieslock, Riesling.....	0.9945	..... 9.83	.....	2.18

In this table the wines are arranged according to their quality. It is obvious that the finest sorts contain a much greater quantity of solid substance in a state of solution than the inferior sorts. The weight of the residue, after evaporation, offers a still safer guide for judging of their commercial value than the quantity of alcohol. It is these substances which disguise the acid in the wine, and conceal its acrid taste; they impart to the wine a thick, oily quality, and give it body.

Among the extractive substances, there is in young wines also found sugar, which is not the case in old wines, and also some gummy substances, which are as yet little known. By evaporating wine, they easily become brown. It appears that the presence of these substances depends chiefly on the soil, and on them depend those differences which cannot be removed by sugar.

It is, for example, possible to improve a Dürkheimer of a bad season by the addition of sugar into a Dürkheimer of a better quality, or an inferior Liebfrauenmilch of Worms into a superior Liebfrauenmilch; but by this means it is not possible to obtain the qualities of a wine grown on a very different soil. The use of sugar cannot cause any mercantile disadvantage, and if there prevail in this respect prejudices, that the value of a wine which otherwise depends upon a superior or inferior soil is increased by the addition of sugar, this prejudice is disproved by the above considerations.

If the neutral tartrate of potash be employed for depriving wine of its acidity, it is absolutely necessary that the required quantity of this salt be first determined by experiments on a small scale. Should any perceptible excess of the salt be added to the wine, the taste of the latter would be impaired. The free acid must not be removed before fermentation has commenced, as it has a great influence on the latter, on which also the taste of the wine depends. If the acid be removed before the fermentation, the latter is certainly not interrupted by it, but the result is a product which has no resemblance to wine.

In France, they have a peculiar mode of fermentation, particularly for some Bordeaux wines. They let the fermentation commence in the unpressed grapes at a rather high temperature, and under but little confined access of air. By this proceeding a volatile flavour (bouquet) is produced, which contains, in most Bordeaux wines, acetic ether, but very likely also butyric ether and valerianic ether. The absence of free acid is here supplied by these conditions which promote the generation of acid.

FERRUGINOUS SULPHATE OF COPPER.

BY VOLLAND.

The Druggists in Brunswick apply the name of semi-sulphate of copper (*Halbkup fervitriol. Cupr. sulph. medium*) to the double salt, sulphate of iron and sulphate of copper (a so-called salzburger vitriol), which the agriculturists chiefly employ in solution, to sprinkle over the wheat fields. An analysis of this vitriol has shown that this sort of ferruginous sulphate of copper consists of two atoms of sulphate of protoxide of iron, one atom of sulphate of copper, and twenty atoms of water. The analysis is—

Cu O, $S O_3$	.....	19.44	.....	1	..... 19.40
Fe O, $S O_3$	.....	36.68	.....	2	..... 36.70
H O	.....	43.88	.....	20	..... 43.90
		100.00			100.00

SIMPLE METHOD OF DEPRIVING BRANDY OF FUSEL OIL.

BY W. PETERS.

Take a cask containing about a hogshead, and fix in the interior, at about three inches from the bottom, a sieve (or false bottom), underneath which apply the tap; above, the cask has an opening for filling it. The cask is then half-filled with well-burnt charcoal, over which five pounds of powdered oxide of manganese and ten pounds of animal charcoal are strewed, to which as much wood-charcoal is added as will fill the cask. The brandy is then poured in and left for three days, when it runs off as clear as pure spirit of wine. Should it be turbid it must be rectified. Such a cask may be used for twelve or fifteen months.—*Pharm. Central Blatt.*

EMPLOYMENT OF TANNIN IN THE MANUFACTURE OF BEET-ROOT SUGAR.

In the manufacture of beet-root sugar, it is of importance to prevent fermentation, which converts crystallizable into uncrystallizable sugar. This fermentation takes place immediately after the beet-root has been mashed. Tannin prevents it by combining with the lime to form a substance which greatly promotes the clearing of the juice. Tannic and gallic acids are also very advantageously employed for clarifying molasses which are intended for reboiling, and are preferable to acids, as they diminish the viscidity and increase the clearness of the liquid.—*Pharm. Central Blatt.*

ON THE DECOMPOSITION OF WATER BY HEAT.

Berzelius observes, that the decomposition of water by heat, effected by Mr. Grove, very likely arises from the increased catalytic power of the platinum, and is not a consequence of the heat. Faraday some time ago noticed, that hydrogen, developed at a very high temperature, does not combine with oxygen by means of platinum sponge, which may serve as an explanation of the result of Grove's experiments.—*Jahresbericht.*

[In our notice of Mr. Grove's experiments (*Pharmaceutical Journal*, vol. vi, p. 236) we suggested that the decomposition might have been owing to the remarkable power which platinum possesses of effecting chemical changes, called by Berzelius *catalytic* power, and not to heat merely.—Ed. Ph. Journ.]

ON THE ACCIDENTAL FORMATION OF FULMINATING SILVER.

BY DR. C. L. RIEGEL.

Dr. C. L. Riegel has made an interesting discovery of the spontaneous formation of fulminating silver. He received some fused nitrate of silver packed in black mustard-seeds. Some of the sticks of the nitrate lying next to the walls of the glass had melted, in consequence, perhaps, of the bottle not having been properly wiped prior to the introduction of the nitrate. He tried to recover the melted portion by washing the seeds with warm distilled water, and evaporating the filtered liquid to dryness in a porcelain capsule. When the mass began to get dry, a violent detonation took place, and the capsule was destroyed. There can be no doubt but that fulminating silver was formed by the development of ammonia from the moistened mustard-seeds. This shows that nitrate of silver ought not to be packed in mustard or rape-seeds, but that poppy-seeds should be preferred.—*Buchner's Repertorium*, Bd. xlvi.

[The idea of packing nitrate of silver in seeds is a novelty to us.—Ed. Ph. Journ.]

NOTICES OF BOOKS.

TRAITÉ DES FALSIFICATIONS DES SUBSTANCES MÉDICAMENTEUSES ET ALIMENTAIRES, ET DES MOYENS DE LES RECONNAITRE. Par F. L. ACAR, Pharmacien en chef de l'Hopital Militaire d'Anvers, Secrétaire de la Société de Pharmacie de la même Ville, &c. Anvers, 1848.

[*On the Falsifications of Medicinal and Alimentary Substances, and on the Means of recognizing them*].

IF we are to judge from the number of Continental works on the sophistication of medicinal substances, as well as from the nature of the adulterations described, we must conclude that the falsification of drugs and chemicals is more frequently practised on the Continent than in this country. M. Acar, the author of the work whose title stands at the head of this notice, tells us, that the falsification of medicines, has, at the present day, arrived at such a degree of perfection, that every Pharmacien who wishes to avoid the risk of keeping impure products, must prepare for himself the articles which he requires.

Our experience of the trade in England is that every Chemist and Druggist or Apothecary, who wishes to obtain pure drugs and chemicals may do so by going to respectable manufacturers and dealers, and buying the best qualities.

A manufacturer of white precipitated mercury once told us that he made three qualities of this article which were designated respectively No. 1, No. 2, and No. 3; the first was pure, the two latter were reduced (in plain English, adulterated) to suit the market price; and he found that most of his customers bought No. 2 or No. 3, on account of their lower cost, though they must have known that the reduction of price could only be effected by reduction of quality.

We saw a manufacturer preparing two kinds of precipitated sulphur; No. 1, or the pure sort, prepared as it ought to be by the addition of hydrochloric acid to a solution of lime and sulphur; No. 2, was made with sulphuric instead of hydrochloric acid, and in consequence contained more than half its weight of sulphate of lime. Yet we were informed that few dealers would purchase No. 1, nearly every one preferring No. 2, on account of its lower price.

We have selected the cases of white precipitated mercury and precipitated sulphur to substantiate our position, partly because the sale of inferior or adulterated qualities of these substances is common in our shops, and also because M. Acar gives no directions for detecting these frauds. The adulterations, however, may in both cases be most readily recognized: in both, the pure articles are dissipated on a red-hot fire-shovel; while the ordinary adulterating agents are fixed and remain behind, being unaffected by heat. In the case of adulterated precipitated sulphur the residue is sulphate of lime; and in that of adulterated white precipitated mercury the residue is usually sulphate of lime, sometimes mixed with sulphate or carbonate of lead, or carbonate of lime.

M. Acar's work is a very useful and valuable one. As an illustration of his mode of treating the different subjects, we select his account of the method of determining the purity of chloroform.

"*Characters of pure Chloroform.*—Chloroform is a colourless volatile liquid, whose density is 1.48 at 64°.4 Fahr. It has a very agreeable

ethereal odour, and a flavour at first piquant, afterwards cool and sweet. It is soluble in alcohol and sulphuric ether, and very slightly so in water. It dissolves iodine, bromine, camphor, and most vegetable alkalies. It does not alter the blue colour of litmus.

"No precipitate is produced in pure chloroform by the addition of a few drops of a solution of nitrate of silver: but if either free chlorine, or a compound of chlorine, be present, a precipitate is formed.

"If a drop of chloroform be put into a mixture of equal parts of distilled water and oil of vitriol, sp. gr. 1.847, and whose sp. gr. when cold is 1.440, it falls to the bottom of the vessel; but if it contain alcohol it either floats or remains suspended.

"Kessler has indicated a source of error. He states that a mixture of alcohol and chloroform being dropped into the test liquor, separates after agitation into a layer of pure chloroform, which falls to the bottom of the vessel and alcohol which dissolves. But if the liquid be not agitated, the drops may remain entire on the surface, and then the best chloroform may float.

"Chloroform dropped into water traverses it, and preserves its limpidity: a whitish opaline tint indicates the presence of alcohol.

"Chloroform ought not to inflame, as it does when it contains ether or alcohol."

M. Acar justly observes, in speaking of opium, that we cannot depend on the aspect of this substance for judging of its quality. He, therefore, directs it to be submitted to chemical examination, with the view of estimating the per-centage quantity of morphia which it is capable of yielding. The process which he recommends, is, if we mistake not, that of Couerbe. It is as follows:

"*Examination of Opium.*—Take 25 grammes [about 386 troy grains] of opium: cut it in very thin slices, and macerate it in 150 grammes [about $5\frac{1}{4}$ fluidounces] of pure water for twenty-four hours. Then triturate in a mortar and pour on a filter the mere divided parts which the liquid holds in suspension: add more water to the residue, again triturate, and pour it on the same filter. Wash with distilled water until the liquid passes colourless. Add to the filtered solution an excess of well hydrated lime*: boil for about five minutes; filter and acidulate the filtered solution with hydrochloric acid, which saturates the lime and combines with the morphia. The latter is to be precipitated by ammonia, expelling any excess of the latter by ebullition. The morphia is to be collected on a filter, washed with dilute spirit, and then dissolved in boiling rectified spirit: it crystallizes on cooling. To separate the narcotine, it is to be washed with ether. The morphia is then to be dried and weighed: 100 grammes of opium should yield 10 grammes of morphia."

M. Acar says that the seeds of black mustard, being more active than those of white mustard, ought to be preferred for therapeutic use. But he omits to give any test by which the admixture of white mustard meal with black mustard meal can be detected. The presence of the former may, however, be readily recognised by infusing the suspected meal in water or spirit, and testing the infusion or tincture with the tincture of sesquichloride of iron: if white mustard seed be present a cherry-red colour is produced.

The articles catechu and kino require correction. The description which the author gives of catechu does not apply to the best catechu of commerce; and the author is in error in ascribing kino to *Nauclea*

* Prepared by pouring 10 parts of boiling distilled water on lime.

Gambir. In the 5th vol. of the *Pharmaceutical Journal*, p. 495, it has been shown that the kino of commerce (or East India kino, as it is frequently called) is the produce of Pterocarpus marsupium. The extract of Nauclea Gambir is known in England as *Gambir*, *Cubical Catechu*, or *Terra Japonica*. Its properties do not at all agree with those assigned by M. Acar to kino.

According to MM. Laroque and Hunt butyrate of zinc impregnated with essence of valerian has been sold for valerianate of zinc. To detect the adulteration about a drachm of the suspected salt is to be submitted to distillation in a tubulated retort with receiver, along with twice or thrice its weight of sulphuric acid diluted with an equal part of water. The acid of the zinc salt distils over, and is to be tested with a concentrated solution of acetate of copper. Butyric acid yields with the cupreous solution a blueish white precipitate, while valerianic acid occasions no visible change, but by agitation is transformed into greenish drops, having an oily appearance, and which in part precipitate, in part float upon the surface of the liquor.

M Acar's work will be found a very useful guide and aid, especially to Belgian Pharmaciens; its faults being rather those of omission than commission. These we hope the author will correct in a future edition, which will, we doubt not, be called for.

A Course of Lectures on Dental Physiology and Surgery, *delivered at the Middlesex Hospital School of Medicine.* By John Tomes, Surgeon-Dentist to the Middlesex Hospital. London: John W. Parker, West Strand. 8vo, pp. 392.

To be noticed next month.

TO CORRESPONDENTS.

Omega.—The sulphas ferri et magnesiæ, ordered in the prescription alluded to, is a salt introduced some time ago and described as a double salt, the proportion of sulphate of iron being about five per cent. It is made by Mr. Peche, Rodney House, New Kent Road.

℥j.—When medical men order liquor taraxaci they should state whose preparation they mean, or give the formula by which it is to be prepared, otherwise the result will vary.

Mr. Rhodes.—We agree in the opinion that the pepper licence is a hardship on Chemists and Druggists. As pepper is among the materia medica, it may, of course, be sold as a medicine without a licence; but if sold for culinary purposes the Chemist is liable to an information, unless he has a licence.

A Constant Reader (Preston).—No.

"*A Poor Chemist and Druggist*" complains that he has received a note from the local Secretary, informing him that unless his Subscription to the Society for the current year be paid, his Journal will be discontinued. This he considers a most arbitrary act, and rather too aristocratic for an institution yet in its infancy. [The Institution (an infant of nearly eight years old) is maintained by means of subscriptions, and without this support, would come to a premature old age and dissolution. The subscription is due on the first of January, and, according to the rules, the privileges are suspended unless the payment is made before the first of April. Our correspondent has had two months grace beyond this, and if the designation which he assumes be correct, he ought not to undervalue his connection with an Institution having a Benevolent Fund.]

E.A.H., wishes for a formula for making the deep blue coloured stars for rockets. He has tried the published receipts and is not satisfied with them.

Juvenis, Ulverston.—The poisonous properties of the essential oil of bitter almonds, as met with in commerce, are due to the presence of hydrocyanic acid, which it contains in variable proportions. This poisonous ingredient is said to constitute 14 or 15 per cent. of the oil in some specimens, and not more than 8 per cent. in others. When purified from the hydrocyanic acid, the remaining oil is innocuous, but unfortunately, if thus deprived of its poisonous property, it absorbs oxygen much more rapidly than it would in its unpurified state, and it thus becomes converted into benzoic acid. The best method of removing the hydrocyanic acid, is described in vol. vii, p. 11.

Ignoramus.—(1.) Impure sulphate of ammonia may be prepared from gas liquor, by neutralizing the ammoniacal liquor with sulphuric acid, and evaporating until the salt crystallizes out. It is also made at some of the gas works by passing the gas through dilute sulphuric acid.—(2.) In preserving plants as wet specimens, spirit, acetic acid, solution of common salt, or Goadby's Solution, may be used. The green colour of the specimens is generally best preserved in acetic acid or Goadby's Solution.—(3.) Application should be made to the publisher.

A.R.P.S.—See vol. vii, page 106 of this Journal.

W.C.T.—We are not aware that the subject has been investigated.

A Constant Reader.—See vol. iv, page 435, and vol. vi, page 419.

"*Botanicus.*"—In most modern works of the kind alluded to, the natural arrangement *is* adopted. Smith and Hooker's *British Flora* would probably answer the purpose required.

"*Tyro*" wishes to be informed of a good method of giving a black surface to common bull's horn.

R. T.—In the formula for *Tinctura Ammoniæ composita* in the London Pharmacopœia, the *stronger solution of ammonia* is ordered, and we see no reason to doubt that this was intended. So far from Mr. Phillips stating in his translation of the Pharmacopœia, as represented by our correspondent, that *Liquor Ammoniæ*, and not *Liquor Ammoniæ fortior*, is used in this preparation, he expressly says "*Liquor Ammoniæ fortior* is employed only in *Tinctura Ammoniæ Composita.*"

W. H. Cockle, Portsmouth, has sent us the following formula for *Tincture of Myrrh and Borax*, in answer to a correspondent in a previous number of the Journal :—

Tincture of Myrrh and Borax.

Take of	Turkey Myrrh.....	℔j
	Eau de Cologne	℔xvj
	Borax	℔j
	Water	℔iij
	Syrup	℔iij
	Essence of rose	℥vj
	Rhatany root	℥iv

Digest for ten or twelve days and filter.

Mr. Lamplough (of Montreal) will perceive that we are not unmindful of the subject to which he has directed our attention.

Mr. Norman's letter arrived too late to be noticed this month.

Advertisements to Mr. Churchill, Princes Street, Soho: Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the Editor, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. III.—SEPTEMBER 1st, 1848.

THE SALE OF BAD OR ADULTERATED MEDICINES.

The term "good enough for America" will henceforth have a new signification in the drug market. It has hitherto been applied to designate articles reduced by decay or ingenuity to American price, a standard bearing no definite ratio to the value of the said articles when good and genuine. We have on a former occasion alluded to this subject and published a circular from the College of Pharmacy in New York*, in which numerous instances of disgraceful traffic between Europe and America were pointed out, and measures were suggested for suppressing the evil. It was obviously a flagrant evil, and demanded a strong remedy. Neither the purchaser nor the vendor appeared willing to admit the error, each imputing the blame to the other. The American merchant ordering blue pill, or any other article, sold it as he received it, and shook off the responsibility; but the English manufacturer who executed the order being tied down to a certain price, and that sometimes half or a third the market value of the article, taxed his ingenuity to please his customer, and sent what was ordered, prepared *secundum artem* according to the price. Within certain limits this system of mutual accommodation may be perpetrated without exciting public attention, the vendor excusing himself by declaring that his drugs are genuine as imported, and the maker urging as his plea that they are made to order to suit his customer. But the abuse had become so flagrant, and the consciences of the parties had acquired so great a degree of elasticity, that the American stomachs began to recoil with disgust and dismay at the trash which was thus systematically thrust into them under the misnomer of "medicines." Many articles were proved to be absolutely inert; of others it was necessary to take five or six times the proper dose in order to produce even a partial effect, and the medical profession being roused to a state of vigilance, discovered that adulteration was so general that no dependence could be placed on the remedies which they prescribed for their patients.

The circular above-mentioned was issued far and wide, and so overpowering was the influence brought to bear upon the Congress in the United States, that a select committee was appointed to enquire into the subject. A few extracts from the Report of this Committee may be amusing as well as instructive:—

* Vol. vii., page 250.

In consequence of the stringent laws now in force in most parts of Europe, regulating the trade in drugs and the dispensing of medicine, none but genuine articles, and those of acknowledged strength and purity, are allowed to be used or purchased. All inferior and deteriorated drugs in a crude state, as well as adulterated medicinal and chemical preparations, must therefore, as a matter of necessity, find a market elsewhere; and that market, unfortunately for the people of this country, has long been and still is found in these United States.

For a long series of years this base traffic has been constantly increasing, until it has become frightfully enormous. It would be presumed, from the immense quantities, and the great variety of inferior drugs that pass our custom-houses, and particularly the custom-house at New York, in the course of a single year, that this country had become the grand mart and receptacle of all the refuse merchandize of that description, not only from the European warehouses, but from the whole eastern world.

Alluding to cinchona bark the report states,

From appearances, it consists mainly of refuse material collected together in foreign warehouses for exportation. It is invoiced from 2 to 7 cents per pound. Thousands of pounds of this trash have passed through the New York custom-house, at the above price, during the past year, and may justly be considered very dear even at those rates.

Genuine scammony, another important drug, is now but seldom imported. Not a single pound of pure Aleppo scammony has passed the New York custom-house during the last twelve months.

The blue pill mass, a vastly important and useful pharmaceutical preparation, comes to us greatly and dangerously adulterated. This article, when pure, contains 33⅓ per cent. of mercury, combined with conserve of roses, &c. The adulterated article, of which large quantities are imported and sold, is, according to the very correct analysis of Professor Reid, of the New York College of Pharmacy, as follows:

Mercury	7.5
Earthy clay	27.0
Prussian blue, used in colouring	1.5
Sand, in combination with clay	2.0
Soluble saccharine matters	34.0
Insoluble organic matter	12.0
Water	16.0
	100.0

More than one-half of many of the most important chemical and medicinal preparations, together with large quantities of crude drugs, come to us so much adulterated, or otherwise deteriorated, as to render them not only worthless as a medicine, but often dangerous.

An article called *opium* is prepared and sold for exportation in the foreign markets, composed of liquorice paste, extract of poppy heads and leaves, and a small portion of gum tragacanth, and a bitter vegetable extract. Another article of opium comes to us, more or less, and in some instances, entirely deprived of its active principle, the same having been extracted for the manufacture of morphine.

So-called opium has passed the New York custom-house, within the last twelve months, so highly charged with liquorice paste, that not only was the smell very perceptible, but on account of the excess of saccharine matter thereby furnished, the worthless mass was alive with worms! Some of these adulterations are invoiced as low as one-third the price of pure opium, and of course are not worth that.

Calomel is adulterated with chalk, sulphate of barytes, and white lead, and furnished by the foreign manufacturer at about two-thirds the price of the genuine.

Sulphate of quinine, another very important medicine, is fraudulently adulterated with silicine (*salicine*), chalk, sulphate of barytes, &c., rendering it comparatively worthless, if not dangerous, as a medicine. This spurious article has been imported and sold in New York (neatly put up with the name, label, &c., of a popular manufacturer) by the agent of a foreign establishment, at the rate of ninety cents an ounce, when the genuine foreign article could not be purchased of the manufacturer for less than two dollars and twenty-five cents an ounce.

Compound extract of colocynth (as the label imports) comes to us in a manner well calculated to deceive ; but, on examination, is found to contain not one particle of colocynth. This spurious article is invoiced at about one-third the price of the genuine article.

Very little, if any, of the pure Russian castor finds its way to this country. An imitation compound of dried blood, gum ammoniac, and a little real castor, put up in artificial bags, is the article generally met with.

But one invoice of real myrrh has been imported into New York during the past eighteen months, while very large quantities of the artificial have been imported direct from Canton, where the manufacture is carried on to a great extent. This impure article is invoiced at less than one-fifth the price of the genuine, and is not possessed of any medicinal quality.

Thousands of pounds of worthless rhubarb-root are sent out annually to this country for a market, by foreign speculators, principally from England. London being the greatest drug market in the world, it is but reasonable to suppose that large quantities of crude drugs, of a greatly deteriorated and inferior quality, must necessarily be constantly accumulating in their warehouses, which, on account of the long existing laws of that country, cannot find a home market, and, in consequence, must either be destroyed or exported to some place where there is no law to prevent their introduction.

We know not "what long existing laws" are alluded to in the above statement *. We have never heard of any positive restraint upon adulteration in this country, except the fear of being found out, and the prospect of having the article returned, with the probable loss of a customer. One indirect restraint might be mentioned, which operates only in the case of drugs *liable to duty* which are so bad as not to be worth clearing. This protection, slight as it is, has been almost entirely removed by the repeal of the duties on most drugs. The law of common sense induces many, and we trust an increasing number, to act upon the principle that "honesty is the best policy," but the law of the land, which would transport a man for forging a cheque, does not recognise "forgery" *in drugs* as a crime, however great may be the amount of the fraud.

Dr. M. J. Baily, Examiner of Drugs at New York, from whose examination some of the above statements are quoted, observes,

It may not be amiss for me here to say, for the benefit of the medical profession and dealers generally throughout the country, as well as for the army and navy surgeons, who purchase chemical and medicinal prepara-

* See vol. vii., page 304.

tions for the public service, that too much reliance in their selections, must not be placed upon what purports to be the name or label of some noted and foreign popular manufacturers, which they may find attached to the bottle or package. For it must be borne in mind, that, while many of the adulterated, fine chemicals, &c., come to us neatly put up in small quantities, for the retail trade, bearing a fictitious label, much of the very crudely and imperfectly manufactured chemicals I have named, together with considerable quantities of morphine, is imported in bulk, or in other words, in bottles or cases, containing several pounds each, and bearing only the name of the article, giving us no clue to the real manufacturers, beyond what may be gathered from the name or names of the exporters upon the invoice, and they are not unfrequently foreign commission merchants. Notwithstanding this, these crude and impure articles, in bulk, find, I regret to say, ready purchasers among unprincipled dealers, who have them put up in small quantities (similar to the genuine) in foreign bottles, imported expressly for the purpose, to which is afterwards attached a neatly executed imitation label of some well-known foreign manufacturing chemist.

Whence do we derive the largest proportion of these adulterated and deteriorated medicines?

Answer. The largest quantity comes from England; but other portions of Europe furnish more or less of these base compounds and worthless drugs.

What proportion of the importers in New York are engaged in this traffic, to any extent, with a full knowledge of the articles imported?

Answer. I know of but two or three of our regular and otherwise respectable houses, who order these vitiated articles from abroad. The business is more generally in the hands of commission houses, where "good, bad, and indifferent" can be found, "in quantities to suit the purchasers." A great proportion of these adulterated articles I have reason to believe are consignments.

From your knowledge of medicine and the information acquired in your present position, are not the deceptions, in many instances, so great as to deceive, not only the people generally, but the profession at large?

Answer. Such is, unfortunately, too true, and what is more to be regretted, these base imitations are rapidly multiplying; giving, at the same time, evidence on the part of the manufacturer of increased proficiency in the deceptive art, as applied to the preparation of vitiated medicines.

We regret that our space does not admit of a more lengthened analysis of the Report, but the labours of the Select Committee have resulted in the following act, which was passed during the present session:—

AN ACT to prevent the Importation of adulterated and spurious Drugs and Medicines.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this act, all drugs, medicines, medicinal preparations, including medicinal essential oils, and chemical preparations used wholly or in part as medicine, imported into the United States from abroad, shall, before passing the Custom-House, be examined and appraised, as well in reference to their quality, purity, and fitness for medical purposes, as to their value and identity specified in the invoice.

Sec. 2. *And be it further enacted*, That all medicinal preparations, whether chemical or otherwise, usually imported with the name of the manu-

facturer, shall have the true name of the manufacturer, and the place where they are prepared, permanently and legibly affixed to each parcel by stamp, label, or otherwise, and all medicinal preparations imported without such names affixed as aforesaid, shall be adjudged to be forfeited.

Sec. 3. *And be it further enacted*, That if on examination any drugs, medicines, medicinal preparations, whether chemical or otherwise, including medicinal essential oils, are found in the opinion of the examiner to be so far adulterated, or in any manner deteriorated, as to render them inferior in strength and purity to the standard established by the United States, Edinburgh, London, French and German Pharmacopœias and Dispensatories, and thereby improper, unsafe, or dangerous to be used for medicinal purposes, a return to that effect shall be made upon the invoice, and the articles so noted shall not pass the Custom-House, unless on a re-examination of a strictly analytical character, called for by the owner or consignees, the return of the examiner shall be found erroneous, and it shall be declared as the result of such analysis, that the said articles may properly, safely, and without danger, be used for medicinal purposes.

Sec. 4. *And be it further enacted*, That the owner or consignee shall, at all times when dissatisfied with the examiner's return, have the privilege of calling, at his own expense, for a re-examination, and on depositing with the Collector such sum as the latter may deem sufficient to defray such expense, it shall be the duty of that officer to procure some competent analytical chemist, possessing the confidence of the medical profession, as well as of the colleges of medicine and pharmacy, if any such institutions exist in the State in which the Collection District is situated [who shall make] a careful analysis of the articles included in said return, and a report upon the same under oath, and in case the report, which shall be final, shall declare the return of the examiner to be erroneous, and the said articles to be of the requisite strength and purity, according to the standards referred to in the next preceding sections of this act, the entire invoice shall be passed without reservation on payment of the customary duties; but in case the examiner's return shall be sustained by the analysis and report, the said articles shall remain in charge of the Collector, and the owner or consignee, on payment of the charges of storage, and other expenses necessarily incurred by the United States, and on giving a bond with sureties satisfactory to the Collector to land said articles out of the limits of the United States, shall have the privilege of re-exporting them at any time within the period of six months after the report of the analysis; but if the said articles shall not be sent out of the United States, within the time specified, it shall be the duty of the Collector, at the expiration of the said time, to cause the same to be destroyed, holding the owner or consignee responsible to the United States for the payment of all charges, in the same manner as if said articles had been re-exported.

Sec. 5. *And be it further enacted*, That in order to carry into effect the provisions of this act, the Secretary of the Treasury is hereby authorized and required to appoint suitably qualified persons as special examiners of drugs, medicines, chemicals, &c., namely: one examiner in each of the ports of New York, Boston, Philadelphia, Baltimore, Charleston, and New Orleans, with the following salaries, viz., at New York sixteen hundred dollars per annum, and at each of the other ports above named, one thousand dollars per annum, which said salaries shall be paid each year quarterly, out of any moneys in the Treasury not otherwise appropriated; and it shall be the duty of the said Secretary to give such instructions to the Collectors of the Customs in the other Collection Districts, as he may deem necessary to prevent the importation of adulterated and spurious drugs and medicines.

Sec. 6. *And be it further enacted*, That the special examiners to be

appointed under this act, shall, before entering on the discharge of their duties, take and subscribe the oath or affirmation required by the ninth section of the act of the thirtieth of July, eighteen hundred and forty-six, entitled, "An Act reducing the Duty on Imports and for other purposes."

Sec. 7. *And be it further enacted*, That the special examiners authorised to be appointed by the fifth section of this act, shall, if suitably qualified persons can be found, be taken from the officers now employed in the respective Collection Districts, and if new appointments shall be necessary, for want of such persons, then, as soon as it can be done consistently with the efficiency of the service, the officers in said districts shall be reduced so that the present number of said officers shall not be permanently increased by reason of such new appointments.—Approved June 26, 1848.

DEPARTMENT OF STATE, *June* 28, 1848.

In order to give due effect to this law by ensuring regularity and uniformity in the conduct of the officers whose duty it is to enforce its provisons, a series of general instructions have been issued under the authority of the Congress, which are as follows:

CIRCULAR INSTRUCTIONS TO COLLECTORS AND OTHER OFFICERS OF THE CUSTOMS.

Treasury Department, July 8, 1848.

The attention of Collectors and other officers of the Customs is specially called to the provisions of the annexed act of Congress, entitled, "An Act to prevent the Importation of adulterated and spurious Drugs and Medicines," approved 26th June, 1848.

Upon entry of any "medicinal preparations, whether chemical or otherwise, *usually* imported with the name of the manufacturer, and the place where prepared, permanently and legibly affixed to each parcel," careful inspection and examination must be made by the United States' appraisers to see that the true name of the manufacturer, and also the place where said articles were prepared, are "legibly affixed to each parcel by stamp, label, or otherwise," as required by the *second* section of the act. In default of these requisites, the Collector will immediately report the case with all the facts to the United States district attorney, in order that he may institute the necessary legal proceedings to obtain a decree of condemnation and forfeiture of the articles in pursuance of the act. When a decree of condemnation and forfeiture, for the causes before stated, takes place, an immediate examination of the articles in the manner indicated in the *third* section of the act must be had to ascertain whether all or any of the articles contained in the importation possess the standard of strength and purity therein required. If any articles do not agree with these standards they cannot be sold, like other forfeited goods, as it would defeat the object of the law thus to throw upon the community adulterated and spurious drugs and medicines. Such portion of the importation as may prove to possess the proper standard of strength and purity may be immediately sold, and the proceeds accounted for as in ordinary cases of forfeiture. But the adulterated and spurious articles contained in the importation must be destroyed in the manner hereinafter mentioned.

It will be observed on reference to the third section of the act, that all imported "drugs, medicines, and medicinal preparations," &c., are to be tested in reference to strength and purity, by the standards established by

the "United States, Edinburgh, London, French, and German pharmacopœias and dispensatories." It is not conceived to be the intention of the law that the articles referred to should conform in strength and purity to each and all of those standards, as such conformity is believed to be impracticable, owing to the variations in those standards. If therefore the articles in question be manufactured, produced or prepared in England, Scotland, France or Germany, as the case may be, and prove to conform in strength and purity to the Pharmacopœia and Dispensatory of the country of their origin, said articles become exempt from the penalties of the law. All articles of the kind mentioned, produced, manufactured or prepared in any other country than those before mentioned, must conform in the qualities stated to the United States Pharmacopœia and Dispensatory.

In case of appeal from the report of the special Examiner, as provided for in the fourth section of the act, the Collector will exercise proper judgment and discretion in the selection of an analytical chemist possessing the qualifications and standing required by the act, to make the prescribed analysis, previously taking from the owner or consignee a sufficient deposit of money to defray the expenses of the analysis, and when completed, returning to the owner or consignee any excess of money thus deposited.

Upon application to export any adulterated and spurious articles in pursuance of the fourth section, proper bond and security must be taken for the exportation and production of proof of landing abroad, as in the case of exportation of goods for benefit of drawback, or from public warehouse.

It will be perceived that the fifth section provides for the appointment at certain designated principal ports of special Examiners of "drugs, medicines, chemicals," &c., and makes it the duty of the Secretary of the Treasury "to give such instructions to the Collectors of the Customs in the other collection districts as he may deem necessary to prevent the importation of adulterated and spurious drugs and medicines."

When, therefore, importations of drugs, medicines, chemicals, &c., take place at any port of entry other than those enumerated in the fifth section of the act, the Collector of the port will appoint, in pursuance of the provisions of the sixteenth section of the act of 1st March, 1823, to be compensated at a per diem rate of five dollars when employed, some respectable person deemed by the Collector to possess suitable knowledge and qualifications, to make examination and report on the value and quality of the articles, according to the standards prescribed by the act. In case of dissatisfaction, and appeal taken by the owner or consignee from said Examiner's report, the same course in respect to analysis and the expenses and proceedings connected therewith, as required at the principal ports, will be pursued. In case a suitably qualified person to act as special Examiner cannot be found at the port or convenient thereto; or when analysis is called for, a properly qualified analytical chemist cannot be conveniently obtained at said port, the Collector will immediately so advise the Department in order that a special Examiner or analytical chemist, according to the circumstances, may be detailed from one of the principal ports to make the examination or analysis at the port of arrival.

The reports of the special Examiners, as also the analysis of the analytical chemists, must be made in writing and signed by them respectively, and filed in the custom-house. Whenever any articles are to be destroyed, as required by the fourth section of the act, they must be conveyed to some suitable place, and proper means, to be prescribed by the special Examiner or Analyst, be used for their safe and effectual destruction, and executed in the presence of an officer of the Customs detailed by the Collector for the purpose. Before destruction of the articles, a particular description or statement of the same must be prepared, containing the name of the importer or owner, the date of importation, the name of

the vessel, and the place from whence imported, with the character and quantity of the articles and the invoice value. The fact of their having been destroyed, must be certified on said statement by the officer detailed for the purpose. These statements must be filed in the custom-house, and returns prepared therefrom must be rendered quarterly to the Department.

Before the special Examiners appointed under this act can enter on the discharge of their duties, the following oath or affirmation, to be administered by the Collector, must be taken and subscribed by them, viz. :—

I, A. B., having been appointed by the Secretary of the Treasury special Examiner of Drugs, Medicines, Chemicals, &c., within and for the port and district of ———, do solemnly, sincerely, and truly swear (or affirm) that I will diligently and faithfully perform the duties of said office as prescribed by the act to prevent the importation of adulterated and spurious drugs and medicines, approved 26th June, 1848, and will use my best endeavours to prevent and detect frauds upon the revenue of the United States. I further swear (or affirm) that I will support the Constitution of the United States. Signed, A. B.

Sworn (or affirmed) before me this day of , A.D. 184

C. D., *Collector.*

These oaths or affirmations must be forwarded for file in the department.

R. J. Walker, *Secretary of the Treasury.*

The College of Pharmacy of New York has also held a Special Meeting on the subject, and published resolutions declaratory of a determination to support and enforce the new enactment by every practicable means.

ADULTERATION OF MEDICINES.

At a special meeting of the College of Pharmacy of the City of New York, held on Thursday evening, July 6th, 1848, the following Preamble and Resolutions were unanimously adopted :

Whereas, upon the application of the College of Pharmacy of the City of New York to the Congress of the United States at its present session, seconded as it had been with one accord by the Medical and Pharmaceutical Institutions throughout the country, by the late National Medical Convention, by Physicians and Apothecaries, and sound-hearted men of all parties, with almost unprecedented unanimity, a law has been enacted and signed by the President on the 26th of June, 1848, entitled, "An Act to prevent the Importation of adulterated and spurious Drugs and Medicines;" which, in our belief, is calculated to arrest the criminal traffic in spurious and adulterated drugs and chemical preparations intended for medical use, so far, at least, as relates to their importation from abroad, which, to the honour of our own country, we believe has hitherto been the chief source of this detestable species of fraud ; and whereas, it becomes our duty from time to time, as occasion presents, to adopt such measures as we may find expedient to carry out one of the prominent objects of our Institution, viz. "to guard against abuses in the preparation and sale of Medicines," therefore

Resolved, That we will, collectively and individually, give our earnest aid to make this salutary law effective in all its parts.

Resolved, That in our judgment, cheating in Medicine is a great moral —and ought to be legal—felony, compared with which, the counterfeiting of bank notes and coin are venial offences.

Resolved, That we will collectively and individually take all proper measures to expose publicly, and discountenance in every manner, all

persons in this country who may be detected in the base crime of adulterating and sophisticating articles and preparations intended to be sold as medicines, and that we will report them particularly to all Colleges of Pharmacy and Medical Institutions with which we correspond.

Resolved, That should any of our own members be guilty of such acts, we recommend the prompt application of the seventh section of the third article of the By-Laws of the College, which is as follows :—

"Complaints may be preferred against any member of the College, to the Board of Trustees, for misconduct in his business, either by the adulteration of articles, or otherwise. If the Trustees are satisfied that such complaints are well founded, they shall appoint a sub-committee to remonstrate with the individual, and if he shall refuse or neglect to remedy the evil complained of, the Trustees may report the case to a meeting of the College, to be called by the President at their request, giving the offending member due notice thereof, and at such meeting he may be expelled, by a vote of three-fourths of the members present."

Resolved, That copies of the foregoing preamble and resolutions be presented to each of the Colleges of Pharmacy and of Medicine in the United States ; that they be published in the newspapers at the discretion of the President and Secretary, and that copies of them be offered for publication to the journals of Pharmacy and Medicine in this country, and to the Pharmaceutical Times and Journal of Chemistry, and the Pharmaceutical Journal and Transactions in London, and the Journal de Pharmacie in Paris.

By order of the College,

WILLIAM H. MILNOR, *Secretary*.

It appears from these documents that the nefarious traffic in worthless drugs in America has come to a crisis—that the members of the profession are fully alive to the urgency of the case, and resolved to wipe away the stain implied in the common saying, "good enough for America." If these efforts should be attended with success, this term will henceforth be held to mean, "fit for medicinal use."

We are fully aware of the numerous and perplexing difficulties attending the undertaking. The impossibility, in some cases, of readily detecting the frauds even by chemical examination, the labour and expense of inspecting the drugs at all ports, and the probability of evasion by smuggling, the ingenuity of packing, and other tricks known in the drug market,—these and other obstacles will be found to operate to a greater or less degree—nevertheless, the object of the law is a good one, and much advantage will arise from the publicity which will be given to the prevalence of adulteration by the means adopted for detecting the fraud. It will probably be discovered in America, as well as in this country, that those who will pay for genuine medicines can have them; but those who are determined to obtain them at half their value may take what they can get. It is better economy to buy what is genuine, and take half a dose, than to pay half price and swallow rubbish.

THE MISCARRIAGES OF MEDICAL REFORMERS.

In travelling on a road beset with swamps and precipices, it is a prudent precaution to make a note of the accidents which have befallen our predecessors in order to avoid similar catastrophes. The road to Medical Reform is one of the most intricate that the legislature has to encounter: it is surrounded with difficult passes, and is so little frequented by the public, that when the traveller is at fault he must shift for himself, no assistance being at hand to help him out of the mud. To add to the dilemma, the guides who undertake to point out the road are interested in leading the adventurer astray, each presiding over his own favourite swamp, into which the victim plunges to rise no more. In this manner the champions of the profession are cut off each in his turn, and every scheme which is brought forward proves an abortion. Years pass away and no progress is made. We begin to class the Medical Reform question with the discovery of the North-west Passage and the source of the Niger—schemes which serve to amuse their respective votaries, who sacrifice their lives in the pursuit of obstacles.

As in the case of the traveller, the first requisite is an accurate survey of the ground, so in arranging the affairs of the profession it is essential to take a comprehensive view of the facts of the case and the circumstances of all the parties concerned.

This has never been done by the advocates of Medical Reform, either in or out of Parliament.

Mr. Warburton was the first who endeavoured to attain this object (1839), his predecessors having been rather advocates of parties than champions of the profession at large. But Mr. Warburton's exertions led to no result, because he carried the principle of free trade too far to suit the bulk of the profession. Mr. Hawes, who came next into the field (1841), went to the opposite extreme, and raised a hornet's nest among the Chemists, who had not been consulted in the matter. Although he emasculated his Bill, which displeased those who had prompted him in its construction, he did not conciliate the opponents, and the Bill fell to the ground.

Sir James Graham then tried his hand (1844), and produced four Bills. The first was founded on suggestions emanating from the Colleges of Physicians and Surgeons, and was attacked by the Apothecaries; the second was modified to suit the Apothecaries, and was opposed by the two Colleges; the third was altered to please all parties and pleased none; the fourth was further amended but without effect; moreover, the third and fourth were violently opposed by the Chemists. Thus each body having led the Secretary of State into the mud, he naturally left all to shift for themselves.

When Sir George Grey came into office, he prudently hesitated in identifying himself with any measure of Medical Reform; but

stated that, when the profession had come to an amicable arrangement as to the general principles, he would be ready to take up the subject.

The Chemists having been repeatedly informed, in reply to their memorials, that their department would come under revision as a matter of course, as soon as the Medical Bill was passed, and perceiving that the Medical Bill had come to a full stop; applied to Sir George Grey in November last year, submitting the draft of a Bill for his consideration, and requesting the favour of his assistance. Sir George Grey replied, as his predecessor had done, that Pharmacy would, without doubt, be considered as soon as the Medical question was settled, and that an opportunity would then be afforded for the Chemists to advocate their proposed Bill; but he expressed his unwillingness to enter upon any branch of the subject under existing circumstances, after the warning which the fate of previous Bills afforded.

In the mean time Mr. Wakley was engaged in framing his Medical Registration Bill (1846-7), the tendency of which was to merge all distinctions of rank in the profession, establishing one general qualification for all practitioners in Medicine, Surgery, and Midwifery. This Bill was at once demolished by the two Colleges, and was succeeded by another, which being also unsatisfactory in some respects, was laid on the table.

Pending the investigation of the Select Committee of the House of Commons on Medical Registration, &c., preparatory to the construction of a new Bill, the Physicians, Surgeons, and Apothecaries, or General Practitioners, very nearly got upon the right track. Their several representatives having met in conference and agreed upon the general principles of an arrangement, the same was submitted to the Select Committee, and for a time the aspect of affairs was encouraging. There were still a few debatable points relating merely to minor details, and the Committee proceeded in the task of taking evidence with a view of smoothing any asperities which might exist. This arrangement, however, did not pretend to embrace the whole question, as it left untouched the most knotty point, namely, the settlement of the differences between the General Practitioners and the Chemists, and from the tenor of the published evidence in the first and second reports of the Committee, the policy of some of the parties concerned was made manifest, as explained in our last number. Such policy, as we have already pointed out, would, if persisted in, widen the breach between the two bodies instead of leading to a satisfactory and radical cure of the existing evils. If the forthcoming Bill should contain no provisions affecting the Chemists in any way, it will not satisfy the Apothecaries; and, we may ask, would the Chemists allow a Bill to pass imposing any restrictions on them, and at the same time giving them neither position nor privileges?

After the resistance which has always been successfully brought into the field, whenever injustice towards our body has been attempted, it would be (to use a mild term) unwise to hazard the success of a Medical Bill by renewing the attempt. It would be waste of time to bring in a Bill, with an exception in favour of "Chemists and Druggists," without defining who are Chemists and Druggists, since any huckster could assume the name and thus evade the law, which would therefore become inoperative; and if a proper definition of the term Chemist and Druggist be introduced, this would open the question of Pharmaceutical legislation, which has been purposely evaded. In case it should be said that we might have waited until the appearance of the final report of the Committee, we may observe that the evidence before us is sufficient to show that a *half-measure* is in contemplation, and we therefore take the earliest opportunity of informing our brethren on the subject, that they may not be taken by surprise.

THE COMMON SENSE VIEW OF THE QUESTION.

Medical Reform, viewed in its proper light, is a trial of strength between education and incompetence. The object to be attained is the discouragement of "irregular practice," which is dangerous the public, and the protection of the rights of those in whom the public may safely place confidence. The principle involved in the question applies equally to every department connected with the cure or alleviation of disease. The several departments, although distinct—according to the division of labour, between the Physician, the Surgeon, and the Chemist—are united in the General Practitioner. A qualification being equally requisite in each, no measure of Medical Reform can be effectual unless universal; and since there are three parties concerned, besides the General Practitioners, each of these parties is equally entitled to consideration. If any one of the three bodies be omitted in the general arrangement, either the functions of that body must cease, or they must merge in another body.

Experience has shown that no two of these bodies can carry a Medical Bill, if violently opposed by the third, or by the General Practitioners, consequently it is an essential element of success to conciliate all. The points at issue between the Physicians, Surgeons, and General Practitioners, relate to the rank and qualification of each class respectively, and can only be settled by a mutual arrangement on the plan already in progress. Between the General Practitioners and the Chemists, the point at issue refers to medical shopkeeping and counter practice. This also can only be settled by a mutual arrangement. To suppose that the former arrangement is sufficient without the latter, is a fallacy. To make an arrangement of this kind between the two parties without the concurrence of both, would be an injustice, even if it

were possible, but the whole profession is interested in the accomplishment of this object by mutual consent. The mode in which it might be effected is simple, and the plan works well in those localities in which it has been tried. It consists in

THE SEPARATION OF PHARMACY FROM MEDICAL PRACTICE.

In suggesting this separation, it must not be imagined that we propose by Act of Parliament to prohibit an Apothecary from sending out a dose of medicine, or a Chemist from administering one. However desirable such a regulation may appear in *theory*, it would in practice be inadmissible without certain limitations. But it would be quite practicable as well as advantageous to both parties, to establish such a general rule as would terminate the existing source of jealousy between the two parties, and thus eradicate the most serious evils connected with the present state of the medical profession. The Chemists are invaded, on one side, by medical men who keep shops, and grasp at all the retail and dispensing business they can obtain; and on the other by hucksters and general dealers, who, by disregarding quality, sell drugs at half their nominal value. This double inroad upon the proper functions of the Chemist obliges him in self-defence to extend his business by "counter practice."

In Scotland this is not the case. The general practitioner is paid for his visits. His usual practice is to prescribe and furnish no medicine. The Chemist furnishes the medicine, but there are no complaints about counter practice. There is no inducement to encroach in this respect; for if a patient happen to consult a Chemist medically, he is referred to a neighbouring medical man for advice, for which the fee is moderate, or in accordance with the standing of the practitioner. Having obtained a prescription he returns to the Chemist for the medicine. The system works well—we hear of no jealousy between medical men and Chemists. The public are well served by both, each performs his own duty, and there is no clashing of interest. In country districts and small villages where there is no Chemist, the Apothecary is of necessity a general practitioner in the most extended sense of the term, and supplies all that is required, charging the medicine, not in separate draughts and mixtures, but in one line at the end of his account. This exception does not invalidate the general rule, which is observed with mutual advantage wherever it is applicable.

In the face of so easy and rational a method of adjusting the differences which form the basis of the leading controversy in the profession, the exclusion of Pharmacy from the proposed arrangement for a measure of medical reform, is an anomaly for which it is difficult to assign an object, and which must be attributed to an imperfect consideration of the whole subject by those who have undertaken to put the medical profession in order.

THE SCHOOLS OF CHEMISTRY AND PHARMACY.

The month of September being selected by common consent as a period of relaxation, the commencement of October is the signal for renewed activity, especially in the medical schools, an example which has been followed by the establishments in our branch of the profession. While our students are recruiting their health in the country, and for a time neglecting chemical researches, except perhaps occasional explosions of gunpowder by means of percussion caps, they should not forget the necessity of making arrangements for the opening of the ensuing session. Those who look forward to attending lectures, should consider the importance of entering upon this avocation with a determination to become acquainted with the whole subject; for which purpose the early lectures are particularly requisite as a key to those which follow. Those who are undecided on the subject, need not on this account absent themselves from the first two or three lectures, which, if attended, might be the means of exciting their interest, and inducing them to enter as students; or if this should not be the result, they might at their option relinquish the intention. It is a source of encouragement to a lecturer to commence with a good class, and it is no less stimulating to the audience to find the lecture-room well attended. In fact, we might almost say that a young man who could enter upon a course of lectures without feeling a desire to continue, would do well to consider whether or not he had chosen a profession suited to his taste. We need add nothing to what we have already advanced in favour of attending lectures as a means of obtaining an insight into the principles of Pharmacy and the collateral sciences, and acquiring a methodical habit of study. We have on former occasions adverted to the proficiency of many of the lecture-pupils at Bloomsbury Square, as evinced at their examinations—an ordeal which is becoming very generally resorted to by our young men, although not yet enforced by Act of Parliament.

Presuming that the advantage of proficiency in Pharmaceutical education is generally appreciated, we need only offer a few observations on the three practical schools now flourishing in the metropolis, namely; the College of Chemistry, the Chemical School at University College, and the Laboratory of the Pharmaceutical Society.

The College of Chemistry is designed for the instruction of pupils of all classes, from the aristocracy to the chemical apprentice, in the higher branches of the science. It is a field for researches in Agricultural Chemistry, and more especially for the prosecution of analysis in those branches of organic structure which afford scope for discovery and the advancement of science. A student must be acquainted with the first principles of Chemistry

before he is competent to join the class in this school, and there is no limit to the extent to which he may pursue the study. The character of Professor Hoffman, the director of the laboratory, and the high patronage the College of Chemistry enjoys, cannot fail to secure for the institution the attendance of a numerous class.

The practical school of Chemistry at University College, under the direction of Professors Graham and Fownes, has similar objects, and although it has less pretension, and has been less favoured by the fostering care of the aristocracy, it is no less sterling in its character, and worthy of support. This school has been resorted to by pupils seeking qualification for the manufacturing arts, for appointments under the Excise, and other Government situations, in which a knowledge of Chemistry is essential. The laboratory contains every facility and convenience for the prosecution of chemical research in all departments of the science.

The laboratory of the Pharmaceutical Society is designed expressly for Chemists and Druggists. Every operation performed in it relates directly or indirectly to the avocation for which the students are qualifying themselves; and the course of study is calculated to store their minds with such scientific knowledge as every person calling himself a Chemist ought to possess, without diverting him from business habits by an undue attention to the abstruse branches of Chemical Philosophy. There are two departments in the laboratory—the synthetical and the analytical. In the former, which is the most extensive and generally attended, all the compounds used in medicine, including those of the Pharmacopœia, are prepared, and the methods of detecting impurities in medicinal substances are taught. In the latter, or analytical department, those pupils who wish to embrace a higher range of study, are provided with every facility for this purpose, under the management of Professor Redwood, whose experience as a Pharmaceutical Chemist enables him to direct the studies of the pupils into those channels which are most likely to be useful to them in after-life.

The lectures of the Pharmaceutical Society are also arranged to suit the requirements of the Chemist and Druggist, and this is the only establishment in the kingdom in which a course of lectures on Pharmacy is given. The lectures on Materia Medica by Dr. Pereira, and on Botany, by Dr. Thomson, are particularly adapted to pharmaceutical students, and those who have attended them diligently during former sessions, have been amply repaid for their exertion, as many of them who are now established in business can testify. The privilege of access to the botanical garden in the Regent's Park is a great advantage, such as few schools, where botany is taught, possess.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

LIST OF MEMBERS,
ASSOCIATES, AND APPRENTICES (*continued*).
Elected July and August.

MEMBERS.

Berwick	Wilson, Robert, Bridge Street
Bury St. Edmonds .	Barker, Edward N., 19, Corn Market
Deptford	Hatfull, Robert, 23, High Street
Harrogate . . .	Allanson, Charles, Promenade Square
Horncastle . . .	Kemp, William, High Street
Liverpool	Edwards, John B., 42, Berry Street
	Maddocks, Samuel, 43, Tithe Barn Street
Liskeard	Brendon, William E., Market Street
London	Wells, Fred. John, 30, Melton Street
Nottingham . . .	Shepperley, James, Long Row
Ryde, Isle of Wight	Roberts, Charles D., Pier Street
St. Leonard's . .	Hempsted, Robert, Grand Parade

MAJOR EXAMINATIONS.

Barker, William Baylis . . .	Liverpool
Starkie, Richard Stringer . .	4, Strand

MINOR EXAMINATIONS.

Evans, Henry Sugden . . .	60, Bartholomew Close
Hope, George Perring . . .	Chester
Rich, Thomas	Lewisham
Wright, William Valentine . .	Ipswich

REGISTERED APPRENTICES.

APPRENTICES.	RESIDING WITH	TOWNS.
Barnett, Francis . .	Messrs. Lea & Co. .	Worcester
Boden, William . .	Mr. Boden	Chester
Bond, Edward . . .	Messrs. Farmer & Co.	Worcester
Holberton, William B.	Mr. Williams . . .	Wellington
Kershaw, George . .	Mr. Cupiss	Diss
Quibell, William O. .	Mr. Harvey	Newark
Tyrrell, John W. . .	Mr. Arnold	Norwich
Wilson, Edward . .	Mr. Bromfield . . .	Crewe

ORIGINAL AND EXTRACTED ARTICLES.

ON THE PRODUCTION OF FURFUROL.

BY GEO. FOWNES, F.R.S.,

Professor of Practical Chemistry in University College, London.

In the year 1845, I published an account of the artificial formation of a vegeto-alkali, resembling in many particulars those occurring in cinchona-bark, produced by the action of ammonia on a volatile oil, generated or developed by heating a mixture of wheat-bran and sulphuric acid*. I was indebted to Mr. Morson for the oil itself so described; it had been in his possession several years, having been presented to him by Mr. William Coley Jones, who had both discovered it and prepared it on a large scale, hoping to turn it to some practical use. Mr. Jones gave it the name *furfurol* from its origin, and published at the time a description of the oil and some of its peculiarities†.

The examination of this substance soon showed its identity with an oily matter sometimes produced in preparing formic acid by the artificial process which had been noticed by Doebereiner, under the name of *artificial oil of ants*, and more carefully examined by Dr. Stenhouse, who succeeded in procuring it in larger quantity by distilling wheat-flour with slightly diluted sulphuric acid. The analyses of Dr. Stenhouse, which agree exactly with my own, assign to furfurol the formula $C_5\ H_2\ O_2$, or the triple of this, $C_{15}\ H_6\ O_6$, presenting the remarkable circumstance of a volatile oil containing hydrogen and oxygen in the proportions to form water.

When furfurol is put into a solution of ammonia, and the whole left to stand a few hours, combination takes place, and a yellowish-white, crystalline, insoluble substance is produced, containing $C_{15}\ H_6\ N\ O_3$, or the elements of furfurol and ammonia, *minus* those of three equivalents of water. This substance is instantly decomposed by acids, with reproduction of furfurol and a salt of ammonia. From these characters I considered it allied to the *amides*, and named it accordingly *furfurolamide*.

When furfurolamide is heated with a solution of potash, no disengagement of ammonia or other evident mark of decomposition occurs, but an isomeric or molecular change takes place, and the furfurolamide passes into a new body, *furfurine* having the same composition, but totally different properties, those namely of a powerful salt-base, capable of forming a series of well-defined and

* *Philosophical Transactions* for 1845, p. 253, also *Pharmaceutical Journal*, vol. v, p. 414.

† *Polytechnic Journal* for April, 1840, p. 311.

crystallizable saline compounds, having an alkaline re-action to test-paper, and even expelling ammonia from sal-ammoniac when boiled with a solution of that substance.

Since the preceding experiments were published, Mr. Jones has kindly favoured me with a description of his original process for preparing furfurol, with permission to make it known. This I do with pleasure, both on account of the interest attached to the chemical history of the product, and the ingenuity of the process itself, which is applicable to a variety of other purposes.

Wheat-bran to the amount of ten cwt. was cautiously mixed in a large wooden vessel lined with lead, with five cwt. of oil of vitriol, diluted with an equal bulk of water, and still hot, the acid being added by small portions, with constant stirring to avoid carbonization. The dark, pulpy, fruity smelling mixture was then immediately transferred to another vessel, constructed in the same manner, of wood lined with lead, and furnished with a closely-fitting cover, which could be made air-tight by luting. A pipe conveying steam passed to the bottom of this vessel, and there terminated in a flat coil perforated with numerous holes. A second pipe inserted in the cover, communicated with a condensing-worm abundantly supplied with cold water. The joints of the apparatus being secured, the steam was admitted, and the distilled liquid, to the extent of six hundred gallons or more, collected in a suitable receiver. This liquid was a weak solution of furfurol. On re-distillation two or three times repeated, until more water came over, the furfurol began to separate as a heavy yellowish oil, and by a repetition of this process, the whole was eventually procured; the ten cwt. of bran yielded about one gallon of crude furfurol, or $\frac{1}{98}$th part. Wheat starch-maker's refuse, or "grains" treated in a similar manner, yielded very pure furfurol.

On repeating this operation on a very much smaller scale, I found it to succeed equally well. The distillatory vessel was replaced by a common stone-ware jar closed by a large cork, which held the mixture of bran and acid; steam was admitted from a small boiler by means of a perforated coil of pewter pipe resting on the bottom of the jar, while the vapours were conveyed away by another pipe to a condenser. Sixty-four troy ounces of bran, thirty-two ounces of oil of vitriol, and an equal bulk of water gave about one ounce of furfurol. Two gallons of liquid were collected, and redistilled many times in the manner above pointed out; the first half only being received, until all the oil was separated. A third gallon contained very little of the oil, showing that it is unnecessary to collect more than about half a gallon of liquid for each pound of bran employed.

A number of experiments were next made with a view of discovering, if possible, the nature of the substance present in bran,

which, by the action of sulphuric acid, yields the oil. The following are the results, which, although not decisive, serve to narrow considerably the question. The process was in each case conducted in the same manner, and with the apparatus already described.

Fine Wheat-Flour.—64 troy ounces of flour, 32 ounces oil of vitriol, and an equal bulk of water, yielded about $1\frac{1}{2}$ drachms of pungent and impure furfurol.

Potato-Starch.—4lb. of starch, 2lb. sulphuric acid, and an equal bulk of water, gave merely indistinct traces of furfurol. The residue in the jar was a brown pulverulent substance, partly soluble in solution of caustic potash, and apparently a mixture of ulmine and ulmic acid.

Woody Fibre.—2lb. new linen cut into small shreds and well washed with boiling water, 1lb. sulphuric acid, and an equal bulk of water gave not the least indication of furfurol.

It was interesting to remark, however, the presence in the distilled liquid of a minute quantity of solid white volatile fatty matter, illustrating the universal diffusion of fatty substances in the vegetable kingdom, since they occur in such a body as linen thread. The residue in the jar consisted of brown insoluble matter, with a little unaltered fibre. This experiment was again repeated with a similar result.

Bran perfectly freed from starch, gluten, &c., either by being steeped in a cold dilute solution of caustic potash, or mixed with water only and left to ferment, well washed and dried, yields a greatly increased product of furfurol. In one experiment 32 troy ounces of bran thus prepared, with the usual proportions of sulphuric acid and water, yielded 1072 grains of furfurol, or $\frac{1}{14}$th of its weight. In a second experiment 80 troy ounces of the same gave 2959 grains of furfurol, or $\frac{1}{13}$th of its weight. In the practical preparation of furfurol, therefore, should this ever become an object of importance, it will be very advantageous to adopt this plan and to operate upon bran thus exhausted by either method, and afterwards dried in the sun, or otherwise. When mixed with the acid the exhausted bran does not become pasty and adhesive, as happens with bran in its ordinary state ; the mixture is thus more quickly and easily made and handled.

Other vegetable tissues besides bran yield furfurol when thus treated, as beech-sawdust, of which 38 ounces, finely sifted, afforded not less than one ounce of the oil, very pure and free from pungency. From these experiments I am inclined to hazard the conjecture that the substance which yields furfurol may possibly be the *matière incrustante* of M. Payen, which forms an important constituent of ordinary woody tissue. The bran after exhaustion by potash, or by the lactic acid developed by fermentation, and

well washed, is reduced to a mere membrane, which under the microscope exhibits a curious dark tesselated or spotted appearance, as if incrusted with regular and uniform patches of brownish opaque matter.

The following particulars may now be added to the description formerly given of the properties of furfurol, some of which, from the small quantity then at my disposal, were open to correction.

When just distilled it is nearly colourless, but in a short time becomes yellow even in the dark, undergoing but little further change. Exposed to light it becomes brown in a few hours. In the hydrated state or in contact with water this change of colour occurs much more slowly. Pure furfurol at 60° Fahr. has the specific gravity of 1.1648. In a glass retort, containing some strips of copper foil, it boils regularly and uniformly at 325° to 326° Fahr., the barometer standing at 29.9 inches. Some blackening and slight decomposition take place with every distillation. It dissolves in twelve parts of water at 60°, and is more soluble at higher temperatures, since a cold milky emulsion-like mixture becomes clear on heating. The specific gravity of the cold saturated solution is 1.0132.

The specific gravity of the vapour of furfurol was carefully determined by the method of Dumas. A little patch of brown matter, the result of trifling decomposition, remained in the globe, but its weight must have been almost inappreciable. The following are the details of the experiment.

Weight of globe, 1347.63 grains.
Temperature of air, 64° Fahr.
Barometer, 30 inches.
Temperature of oil-bath, 380° Fahr.
Weight of globe after experiment, 1356. grains.
Capacity of globe, 23.13 cubic inches.
Residual air-bubble, .12 cubic inch.
Specific gravity of vapour, 3.493.

From this it follows that the formula for furfurol should be the very simple one, $C_5 H_2 O_2$, and not the triple of this, as formerly assumed, since every volume of vapour will be thus represented:

5 volumes	hypothetical carbon-vapour*	.4183 × 5	= 2.0915
2 "	hydrogen	.0693 × 2	= .1386
1 "	oxygen		= 1.1057
1 "	vapour of furfurol		= 3.3358

University College, July 29th, 1848.

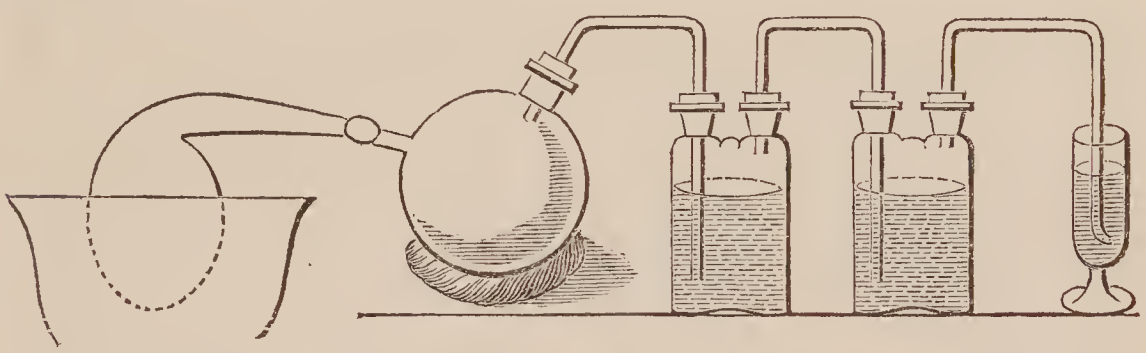
* On the supposition that carbonic acid contains equal volumes of oxygen and carbon-vapour, condensed to one-half.

ON THE MANUFACTURE OF OXALIC ACID.

BY MR. LEWIS THOMPSON.

As no accurate account of the decomposition which ensues in the manufacture of oxalic acid has yet been published, that I am aware of, the following experiments may tend perhaps to draw attention to this subject.

The apparatus employed, consisted of a large glass retort, placed in a water-bath, and luted to a tubulated receiver, from the opening in which a tube passed into a two-necked bottle, containing a solution of ammonia; this bottle was connected by a tube, with another of the same size and form, containing a solution of nitrate of lime, from which an exit tube passed, which dipped under water, and allowed the escape of the incondensible gaseous matter. The subjoined sketch may perhaps assist in explaining this arrangement :—



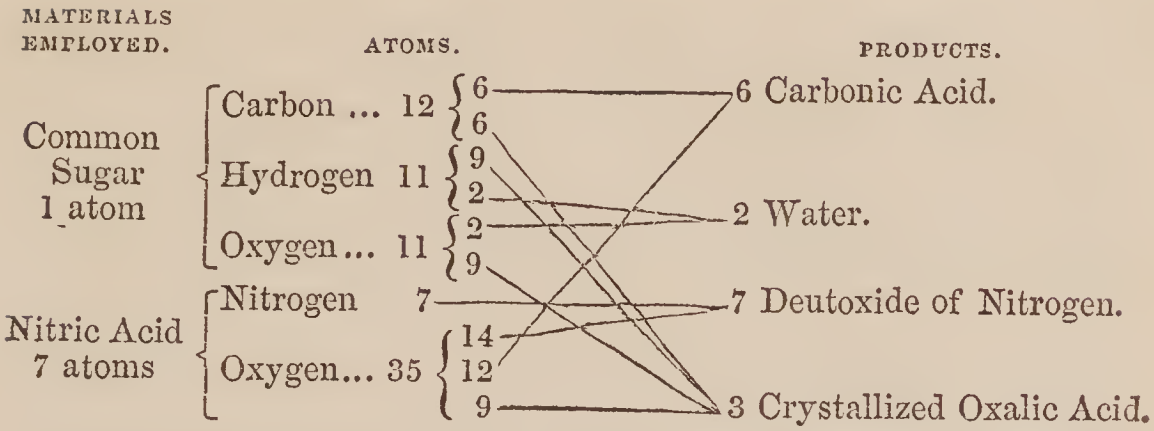
The temperature of the water-bath was maintained as nearly as possible at 125° Fahr., for forty-eight hours in each experiment, after which the solution of oxalic acid was set aside for two days to crystallize. The crystals were allowed to effloresce in a drying stove, so as to remove all excess of nitric acid; they were then dissolved, recrystallized, dried and weighed.

The amount of carbonic acid was determined by mixing the solutions of ammonia and nitrate of lime after each experiment, allowing the carbonate of lime to settle for twenty-four hours, after which it was washed, dried, and weighed. The sugar employed was the best refined white, and it lost nothing in weight by prolonged exposure to a temperature of 212°. The nitric acid was pure, and of specific gravity 1.245 at 60°; it contained as nearly as possible, one-third of its weight of dry acid, as was proved by the amount of pure carbonate of soda which it neutralized. The following table exhibits the results of eight experiments, showing the amount of sugar and dilute nitric acid employed, and the quantity of oxalic acid and carbonic acid produced. The liquor

from the receiver and the mother-liquor of each experiment being added to the one following :

	EMPLOYED.		OBTAINED.	
	Sugar in ounces.	Dil. Nitric Acid in ounces.	Oxalic Acid in ounces.	Carbonic Acid in ounces.
No. 1....	28	184	17½	20½
2....	28	184	32¼	22¼
3....	28	184	30	21
4....	28	184	29½	21½
5....	28	184	31¼	22
6....	28	184	30½	21
7....	28	184	30¼	21½
8....	28	184	31	21½

A large quantity of mother-liquor remained, from which no crystals were attempted to be obtained, as these may be set against the small produce of experiment No. 1. If then we omit this experiment altogether, we shall have an average of the seven following, showing that 196 of sugar and 1288 of diluted nitric acid, have produced 214¾ of oxalic acid and 150¾ of carbonic acid, and that the proportion of carbon in the oxalic acid obtained almost exactly equals that in the carbonic acid, and that by the action of nitric acid in the way described, one-half of the carbon of any given quantity of sugar, is converted into oxalic acid, and the other half into carbonic acid. I have made many experiments with nitric acid of various densities and at various temperatures, but without obtaining in any instance so large a produce of oxalic acid, as with acid of the strength indicated. When strong acid is employed, the temperature rises too high, and a quantity of formic acid is occasionally produced, which distils over into the receiver, and materially diminishes the produce of oxalic acid. From these experiments it would appear that no more than 124lbs. of oxalic acid can be obtained from a cwt. of sugar. This, I am aware, is much below the quantity generally supposed to be produced on the large scale, and which is stated to vary from 135 to 140lbs. for the cwt. of sugar; such acid is however contaminated with nitric acid and mother-liquor, and is moreover decidedly damp, as shown by the manner in which the crystals cling to the sides of the bottle in which they are contained—some allowance must also be made for the tendency to exaggeration which prevails in our manufactories. Of this at least I am sure, that in some hundreds of attempts conducted on a pretty large scale, I have never once exceeded the amount here stated (124 lbs.) when the acid was properly purified and freed from adhering moisture. The following diagram in my opinion represents the nature of the ultimate decomposition which ensues in this manufacture, although other substances are unquestionably produced in the first instance :—



These proportions do not greatly differ from those employed in practice by oxalic acid-makers, when allowance is made for the loss of nitric acid incidental to their mode of manufacture. The following is the general proportion of materials employed :—

Sugar	112 lbs.
Nitrate of potash	560 lbs.
Sulphuric acid	280 lbs.

which are said to produce 135lbs. of oxalic acid, and 490lbs. of sulphate of potash or sal enixum.

Experiment has proved to me that the first change produced, is to convert the cane-sugar into grape-sugar, and as the first portions of gas evolved consist almost entirely of nitric oxide with little or no carbonic acid, it is clear that some compound is generated in the commencement of this process, which contains the elements of sugar united to an excess of oxygen—the above diagram must therefore be looked on as merely explanatory of the ultimate change.

Byker Bur, Newcastle-on-Tyne,
August 15th, 1848.

REMARKS ON THE SACCHAROMETER CONTROVERSY.

BY MR. MAURICE SCANLAN.

HAVING been for some time past, and up to this time, occupied in a suite of experiments upon the production of oxalic acid from sugar and starch, with a view to ascertain the most economical mode of making this important article of chemical manufacture, it appeared to me that one of the first problems necessary to be solved, was the quantity of saccharine matter contained in molasses and in the different raw sugars usually met with in commerce. The solution of this problem seemed to me necessary, in order to compare the product of oxalic acid obtained on the great scale from these saccharine matters, with that obtained by exact experiment on pure sugar, as well as with what should be obtained according to the theory usually received, of the changes that take

place when sugar is acted upon by nitric acid, on the supposition that there is nothing produced but oxalic acid, with the escape of NO_2 and CO_2. During these researches, my attention was directed to the mode of determining this important point, which has given rise to discussion in the late numbers of your Journal. With a view of testing its accuracy, I procured from Messrs. Cook and Co., of Mincing Lane, eminent colonial brokers, the undermentioned samples of sugars, which I dried at 212° F., dissolved one part of each in two parts of water, took the specific gravities of the filtered solutions at 60° F., with the greatest care, and noted the amount of impurities left on each filter. The result is given in the following table, in accordance with that already published in your Journal by Messrs. Long and Atlee, as verified by Dr. Ure, and proves beyond all doubt that no conclusion can be thence drawn as to the proportion of crystalline and non-crystalline matter in raw sugars, or what is commonly called their relative strengths. Any saccharometer, therefore, founded on specific gravity must be fallacious.

TABULAR VIEW OF THE EXAMINATION OF RAW SUGARS.

Names of Sugars.	Loss of Weight in Drying per cent.	Insoluble Matter per cent.	Specific Gravities of the Solutions at 60°.
1. Yellow Havanna, No. 2...	1.11	0.42	1.1378
2. Java.....	0.5	0.27	1.1365
3. Average Demerara	4.0	0.65	1.1392
4. Yellow Bengal	4.8	0.56	1.1384
5. New Muscovado Trinidad	6.0	0.96	1.1379
6. Average Jamaica	3.1	0.57	1.1403
7. White Bengal.....	2.5	0.30	1.1371
8. White Havanna.....	0.5	0.18	1.1368
Pure Refined Sugar	.005	—	1.1458

I may mention that these experiments have been carried on with the valuable assistance of my friend, Mr. Henry Medlock, and that all our weighings were performed with a delicate balance made by Ortling ; and further, that pending these experiments, I was favoured with a visit by Mr. Lewis Thompson, who took some interest in the subject, and witnessed the making of the solutions, and taking the specific gravities as above described, and he agrees in the opinion above expressed, that "the experiments prove that all samples of sugar, *when equally dry*, afford, with water, solutions having the same specific gravity, and that consequently any attempt to determine the commercial value of such sugars by the specific gravity of their solutions is entirely fallacious."

15*th August*, 1848,
Chemical Works, Great George Street, Bermondsey.

ON SUGAR.

BY ANDREW URE, M.D., F.R.S.

That no subject of extensive manufacture is so little understood, at least in its practical manipulations, by Chemists, as sugar, may seem a startling paradox; but it is a truth familiar to sugar-refiners, and which may be made manifest by a simple experiment. Let any one dissolve a few pounds of brown sugar in water, filter the solution if need be, and reconvert it by evaporation, &c., into sugar, and see how much he will recover of like firm grain as the sample used. The defalcation will not be less than 10 per cent.; most probably a great deal more. Even with refined sugar similarly treated, the original quality and quantity will not be restored, because the crystalline force of sugar is most easily impaired. A dexterous sugar-boiler will however manage the experiment much more successfully, and reproduce a large proportion of fine-grained sugar: a result which I have often witnessed.

In many of our colonies, for every two parts of sugar produced from cane-juice, about one part of molasses is separated in the curing-house, while about 10 or 12 per cent. of the shipped sugar is lost by drainage in the voyage home. About twenty years ago most of our sugar-refiners boiled their syrups in open pans; but now all of them evaporate *in vacuo*, by the apparatus first suggested by Sir H. Davy (as Mr. Children informed me), but improved and patented by the Hon. Mr. Howard. At the former period (1830) a keen controversy was carried on between the sugar planters and the refiners on the one side, and our Government on the other, relatively to the amount of drawback paid by the Treasury on the exportation of refined or loaf sugar. The former parties contended that the drawback was a sum merely equivalent to the duty paid on the importation of the raw sugar, while the Right Hon. the Lords of the Committee for Trade and Plantations, with many Members of Parliament, considered the drawback as involving a large bounty from which the sugar-refiners had realized great fortunes, and the West India proprietors proportional *bonuses*. The Government having tried in vain to find out the truth, so carefully concealed by the parties interested, finally resolved to cause this great national problem to be solved under their own auspices. The President and Vice-President of the Board of Trade being apprized by the Chairman of the Molasses Committee of the House of Commons (which had several times examined me, and required me to make experiments for them) that I was occupied with researches on sugar, sent for me to meet with a deputation of the sugar colonists and refiners at the office of that Board. I was then requested to conduct a series of experiments on the refining of sugar upon such a considerable scale as

would settle the average yield per cwt. or ton in refined loaves, bastards, and treacle, of a few different descriptions of raw sugar. I was invested with full power to rent a sugar-house for a short time—to fit it up as I thought best—to hire a proper corps of workmen, &c., so as to solve the important problem put into my hands. It was then understood that my labours might be completed within the period of a year. I was also empowered to draw whatever sums of money might be wanted from the Collector of the Customs; but after a little reflection I declined to meddle with any pecuniary matters, and persuaded the Collector to undertake that part of the business. An intelligent and faithful officer of the Customs was granted to me to watch over the property, superintend the conduct of the workmen, and take charge of the keys of the house.

The Government allowed two gentlemen, named by the West India Association and two by the sugar refiners, to watch over all my operations—a task which they fulfilled most conscientiously all the time that the experiments were going on, one of them having taken lodgings next door to the sugar-house. This was a small building near the Commercial Road, which had not been rightly finished, and was quite unfurnished. It had been stipulated by the refiners that I was to boil the syrups in an open pan, and to use not more than five per cent. of bone-black. Some months were spent in fitting up the house and mounting the requisite apparatus; in which interval I visited many of the sugar refineries in London and Paris, in order to become familiar with the various manipulations. My operations commenced on the 20th January, 1832.

In the first experiment, 152 cwt. 1 qr. 13 lbs. of raw sugar were operated upon; and the balance of profit in favour of the refinery upon it, was

	Cwts.	qrs.	lbs.		£	s.	d.
					68	10	6
2d Experiment on	198	3	19	profit =	106	18	11
3d "	199	0	14	"	48	10	3
4th "	304	1	5	"	162	15	4
5th "	311	3	9	"	100	6	10
6th "	307	0	7	"	103	10	4
Cwts.	1473	2	11		£590	12	2

The produce in loaves, bastard sugars, and treacle was subjected to a most minute examination by the gentlemen superintendents, as well as the searcher of the Custom-house, and it was all sold in the open market in Mincing Lane. The expense of the house-rent, wages of workmen, and apparatus could not much exceed £3000—that business being well attended to by the Collector of the Customs: Mr. Wolsey, and other sugar-refiners who occasionally visited the house, considered the operations to have been as well conducted as possible in the circumstances. I had reason to be sus-

picious of false play on the part of one or two of the workmen, who were evidently influenced by the fear of injuring their trade and employment in the sugar-houses. I believe that a considerable quantity of the sugar in the last two experiments had been purposely burned by throwing the syrup from the pan into the fire; and I requested the Earl of Auckland, then President of the Board of Trade, to order an investigation to be made upon the subject before a magistrate; but as he regarded my labours as quite satisfactory to the Government, he thought it superfluous to take that trouble.

The result of my operations, as stated by the Right Hon. Poulett Thomson (afterwards Lord Sydenham), Vice-President of the Board of Trade, when he laid my report on the table of the House of Commons, was to show that upwards of half a million sterling had been annually lost to the Exchequer in bounties, involved and concealed in the excess of the drawbacks on exportation over the duties paid to it on importation. Afterwards a bill was introduced into Parliament by the Chancellor of the Exchequer, the Right Hon. Spring Rice (Lord Monteagle), founded on my experiments, and passed into law, whereby the rate of drawback was reduced by about 16 per cent., constituting a near approximation to the rate of duties paid.

If I be asked what sum was allowed me for nearly two years most vexatious labours, among contending parties, with an unfaithful troop of workmen, in which so important a fiscal point was settled, I answer £800; at the rate of £400 per annum. That sum was sent to me by the Lords of the Treasury, accompanied with a polite letter of thanks for my successful operations.

The sugar-house having been hired merely to perform these experiments, was then given up, and its apparatus, &c., sold. It was rented, I believe, at about £50 per annum; but with that I had no concern.

These daily sugar-house investigations for so long a period, and the analysis of upwards of a hundred samples of cane-juice syrup and molasses for the Custom-house in the course of the subsequent fifteen years, may entitle me, without the charge of presumption, to claim a tolerable acquaintance with sugar in its commercial relations at least; and I can safely affirm that no cargo of colonial cane-syrup ever came as such to this country without containing uncrystallizable molasses matter, mixed with its sugar; and therefore he must be an awkward or deceitful operator who declares such syrup to be crystalline sugar. But colonial molasses contain always more or less saccharine grain. Mr. H. N. Browne, an eminent sugar-refiner in London, states, in answer to the 3999th question of the Report of the Molasses Committee of the House of Commons, that he extracts from 30 to 38 lbs. of sugar from

one cwt. of West India molasses, and that some of that sugar may be refined into loaves. So far is the best colonial molasses from being the type of non-crystallizable syrup, as has been lately assumed by two prominent Chemists.

The *temper* lime used in boiling cane-juice in the Colonies combines with the gluten, and forms the colouring matter of raw sugar—a compound readily removed by the feeblest acid; but this acid can be safely applied only through the medium of alcohol. On this chemical principle I obtained a patent in October, 1830, for blanching brown sugar by very faintly acidulated alcohol, a compound which might be prepared cheaply in the Colonies at that period. Such a menstruum had never been used before, though alcohol alone had been tried in the Mauritius and elsewhere, but did not answer. The nature of that patent has been misrepresented by a correspondent in the last number of this journal.

After the value of these sugar-refinery researches had been fully recognized both by the Administration and the Parliament, I was advised to apply for a remuneration somewhat more adequate to their difficulty and importance, but I declined to solicit any favour from any of the ministers of state, with whom I continued on terms of confidential intercourse for several subsequent years. Nor during a service of fifteen years for the Customs, in which the duties on cane-juice, and many other articles of extensive importation, were rated for duties in conformity with my reports, did I ever stoop to receive the least *douceur* from any interested parties, though I was occasionally blamed (but unjustly) for over-rating the duties leviable. I cannot reproach my conscience with ever setting a snare for filching a premium from the public purse for an imposture of any kind, I have never sought the connivance of corrupt functionaries for such a purpose, and I have never bribed scientific confederates with the prospect of a large fee to certify the truth of a delusion. On the contrary, when the officers of the Customs consulted me non-officially, they always received gratuitous confidential information. In the same spirit, they were freely offered a true and easy method of estimating the proportion of crystalline and non-crystalline matter in raw sugar, upwards of two years ago, but they declined to avail themselves of the offer, under some selfish sinister influence, which I then only surmised, but now clearly understand. Left alone with their idol, they have found it to be a blood-sucking vampire, and hold it now in merited execration.

Alas! how lamentable is it to perceive how little reverence for truth, how little moral sensibility is evinced by some of our prominent *savans;* how ready they are to cloke a profitable scientific error committed by them, with every art of obliquity, sophistry,

or downright falsehood! Thus, Joyce's stove was inaugurated as innocent by two cockney Chemists, in defiance of a coroner's inquest, declaring it to have poisoned a man, and of Gay-Lussac's denunciation of its fumes as carbonic acid gas, with which the younger Berthollet did, and many of his countrymen do, daily commit suicide.

As goats browse upon hemlock, so some persons live upon lies, having a sharp scent for the things rank and vile which possess the unweeded garden of our public offices, our *atéliers nationaux*, as *Punch* ingeniously calls them. Hence we can understand how powerful is the elective attraction between jobbers and empirics, as exemplified in the coalition formed between corrupt functionaries and a master quack, for the purpose of getting rid of an honest guardian of the revenue. "Try every art of legal thieving," sings Burns in sportive irony; "Woe to him who loves the wages of unrighteousness, or retains an ill-got fee," says the divine moralist. I thank God, who has enabled me to resist all such temptations, which have been plentifully thrown in my way, and I say with Juvenal—

"———— me nemo ministro
Fur erit."

24, *Bloomsbury Square*, 17*th August*, 1848.

NAPHTHA.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Dear Sir,—In my short paper on "Naphtha," in your preceding number, I have stated as components of coal-tar, certain articles which Mr. Mansfield, to whom I referred, does not consider to exist ready formed in it, but which may be generated by chemical re-actions, and which, he says, in a letter to me, that he purposes to have manufactured from coal tar for practical purposes in the arts. Yours truly,

Andrew Ure.

17*th August*, 1848.

IMPURITIES IN COMMERCIAL HYDROCHLORIC ACID.

BY MR. THOMAS H. SAVORY.

There are two kinds of hydrochloric acid commonly kept by Chemists and Druggists, one of which is recognized as pure and fit for use in medicine, while the other is avowedly impure, and only adapted for economical and manufacturing purposes. The pure acid is colourless, while the other is always more or less coloured by reason of the impurities present. Among the im-

purities mentioned in Chemical and Pharmaceutical works, as most commonly occurring in this acid, are iron, sulphuric acid, free chlorine, nitrous acid, arsenic, and lead. Sulphurous acid is also mentioned by Professor Graham as existing in this acid, but little or no notice is taken of this impurity in the works most generally referred to by Druggists.

Some impure hydrochloric acid having been used for generating carbonic acid gas in some of the operations conducted by the laboratory pupils here, the evolved gas was found to be largely contaminated with sulphurous acid. Subsequent specimens of acid obtained from several different manufacturers afforded similar results; and on submitting these specimens to a more careful examination, it appeared that sulphurous acid was not only present, but formed an important constituent, as the following analyses will show :—

No. 1.
Sp. gr. at 60° *F.* 1.166.

COMPOSITION.	GRAINS.
Hydrochloric Acid	29.9349
Sulphurous Acid	10.8450
Sulphuric Acid	.1538
Perchloride of Iron	.8364
Water	58.2299
	100.0000

No. 2.
Sp. gr. at 60° *F.* 1.163.

COMPOSITION.	GRAINS.
Hydrochloric Acid	31.3708
Sulphurous Acid	7.0530
Sulphuric Acid	.0738
Perchloride of Iron	.0052
Water	61.4972
	100.0000

No. 3.
Sp. gr. at 60° *F.* 1.1638.

COMPOSITION.	GRAINS.
Hydrochloric Acid	28.7278
Sulphurous Acid	8.4152
Sulphuric Acid	.1562
Perchloride of Iron	.0461
Water	62.6549
	100.0000

The presence of sulphurous acid in such large proportions is no doubt principally due to the use of impure salt and oil of vitriol in the process of manufacture, the organic matter present being oxidized at the expense of some of the oxygen of a portion of the sulphuric acid. It may also in part arise from the employment of iron retorts, and from the application of too high a temperature, which would decompose the bisulphate of soda and liberate the volatile anhydrous sulphuric acid, together with sulphurous acid and oxygen gas. The method I adopted for estimating the sulphurous acid was to precipitate the sulphuric acid with chloride of barium, then to neutralize the remaining free acid with potash—to evaporate the solution to dryness—to fuse the resulting salt with nitrate of potash—to dissolve in water, and estimate the sulphurous acid originally present from the precipitate now afforded with chloride of barium.

It appeared desirable that the attention of Chemists and Druggists should be directed to this subject, as it is evident that the common hydrochloric acid of commerce ought not to be employed in any Pharmaceutical processes.

Laboratory, 17, *Bloomsbury Square.*

PREPARATION OF ANHYDROUS SULPHURIC ACID.

BY MR. H. SUGDEN EVANS.

The process we find described in most chemical works, for the preparation of anhydrous sulphuric acid, consists in submitting Nordhausen oil of vitriol to distillation at a low temperature, with a suitable apparatus for condensing the white fumes which pass over. Owing, however, to the difficulty of procuring, in this country, good Nordhausen oil of vitriol, containing any appreciable quantity of the anhydrous acid, this process has failed in the hands of many who have tried it, and the substance under notice is generally looked upon as a rare chemical product. In its crystalline state, it is so beautiful an object, that many Chemists would, no doubt, be anxious to add it to their collection of chemical specimens, if they knew of an easy process by which to prepare it.

Some years ago Doebereiner and Magnus described a process for its preparation which consisted in passing a mixture of dry sulphurous acid and oxygen gases through a tube filled with spongy platinum and heated to about 572° Fahr.; but this process requires a somewhat complicated apparatus, and would not be very easy of execution by an amateur manufacturer.

More recently a notice was published in the *Comptes Rendus*, of a process suggested by M. Ch. Barreswil, for obtaining it by means of anhydrous phosphoric acid. I have tried this process, and have found it to be neither difficult nor expensive. The process was not very minutely described in the notice of it above alluded to, and therefore, as the result I have obtained has been perfectly satisfactory, I am induced to describe the arrangement that was adopted, for the guidance of those who may wish to prepare a specimen of this interesting compound.

I first obtained some highly concentrated oil of vitriol, by heating commercial oil of vitriol in a retort until a considerable portion of weak acid had distilled off, and that which remained in the retort had acquired a density of 1.845. Some anhydrous phosphoric acid was then made by burning phosphorus beneath a receiver placed over a plate of glass, allowing free access for dry atmospheric air. The successive portions of the white flakey substance thus formed were immediately transferred to a wide-mouthed stoppered bottle, until a considerable quantity of it was collected.

On mixing these two acids (SO_3, HO and PO_5) together, strong chemical action, accompanied by great elevation of temperature, occurs, to counteract which, it is necessary to make the mixture in a vessel surrounded by a freezing mixture.

The phosphoric acid was introduced into a stoppered retort, surrounded by a mixture of pounded ice and salt, and the oil of vitriol was gradually added, allowing the temperature to subside between the successive additions. When a quantity of oil of vitriol, equal to about two-thirds the weight of the phosphoric acid, had been thus added, the mixture, which acquired a dark brown colour, was removed from the cooling bath, and a receiver was placed there, to which the retort was adapted. A gentle heat was now applied to the retort, and dense white vapours soon began to pass into the receiver where they were condensed by the cold. In this way a considerable quantity of beautiful white silky crystals was obtained. The whole process occupies but a short time, and no other precaution is necessary in conducting it, than that of avoiding too great an elevation of temperature on mixing the oil of vitriol with the dry phosphoric acid. With careful manipulation one ounce of phosphorus, being first converted into anhydrous phosphoric acid by combustion in dry air, and subsequently into glacial phosphoric acid by dehydrating the oil of vitriol, would yield about an ounce of the anhydrous sulphuric acid. The process, therefore, at the present low price of phosphorus, is inexpensive as well as easy of execution.

It may be well to mention, as a caution to those who are not acquainted with the properties of this body, that although, in its anhydrous and crystalline state, it has none of the characters of an acid, not even changing the colour of blue litmus, nor attacking the skin when applied to it, yet so powerful is its tendency to absorb water and pass to the state of the highly corrosive oil of vitriol, that the addition of a few drops of water to it in a bottle causes a dangerous explosion, from the great and sudden evolution of heat which takes place.

Laboratory, 17, *Bloomsbury Square.*

ANALYSIS OF THE BROMINE MINERAL SPRING OR WELL OF TENBURY, WORCESTERSHIRE,

The Property of S. Holmes Godson, Esq.

BY ANDREW URE, M.D., F.R.S.

By methods somewhat similar to those described in my paper on the "Analysis of the Moira Brine Spring," which the Royal Society honoured with a place in their *Transactions* for 1834,

part ii., I obtained the following results from one gallon = 70,000 water-grain measures :—

	Grains.
1. Chlorsodium (muriate of soda)	1301.4
2. Chlorcalcium (muriate of lime)	425.6
3. Chlormagnesium (muriate of magnesia) ...	51.3
4. Sulphate of lime.....	6.0
5. Protocarbonate of iron	1.5
6. Bromide of sodium (bromsodium)	16.2
Total saline contents =	1802.0

Specific gravity of the water at 60° F., = 1.0208

Taste, bitter saline, but not unpleasantly so.

This water has been long prized for its medicinal virtues as a deobstruent. In reference to the bromine constituent, it is doubly richer than the Moira spring water.

The determination of the presence and approximate proportion of bromine in such a saline water, is attended with no difficulty. Having concentrated a considerable quantity of it by evaporation to such a pitch as to separate the greater part of the readily crystallizable muriate of soda, add to the filtered mother-water a small portion of pretty strong chlorine-water. The bright golden yellow colour immediately produced indicates the bromine, now eliminated from its state of hydrobromic acid. Ether being poured into the bottle partially filled with the saline solution, and agitated therewith, seizes the bromine, and on repose rises with it, and floats in a rich crimson solution on the top of the decoloured liquor. Care must be taken that chlorine has not been used in excess, otherwise the next processes would be vitiated, which consist, first, in decanting the ethereous compound, and saturating it with pure potash lye, so as to form bromide of potassium. This solution being evaporated, and gently ignited, is to be supersaturated with nitric acid, and the bromine precipitated with nitrate of silver, and the brown silver bromide washed, filtered, dried, and gently ignited. 100 parts of that bromide represent 41.5 of bromine. In Mr. Godson's mineral spring, there are very nearly $12\frac{1}{2}$ grains of bromine per gallon, which are therefore worth extracting on the large scale from the water.

The ether, which has been stripped of its bromine by potash lye, may be nearly all recovered, with proper precautions, so as to be repeatedly applied to fresh quantities of chlorified mother-water. If the bromide of potassium be mixed with one-third of its weight of peroxide of manganese, and the mixture distilled with its own weight of sulphuric acid diluted with half its weight of water, from a retort whose beak dips into a receiver containing water, the bromine which comes over falls to the bottom, and may be

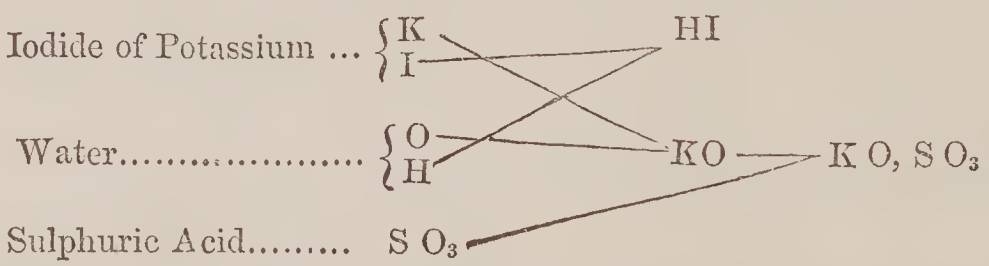
entirely de-hydrated by re-distillation over chlorcalcium (calcined muriate of lime).

The bromine may also be extracted, and that very economically, by distilling the chlorified mother-water of the spring with the mixture of manganese and oil of vitriol. The bromine which passes over may be afterwards purified by washing with water, and then by the process above described, with potash, nitric acid, &c.

PHARMACOPŒIA TEST FOR IODIDE OF POTASSIUM.

A Correspondent, D.B., of Aldersgate Street, has directed our attention to one of the tests described in the notes to the Pharmacopœia for *Iodide of Potassium*, which is thus expressed,—"*Sulphuric acid and starch, added together, it becomes blue.*" "The truth is," says our correspondent, "that the above is a test of the impurity, not of the purity, of the article, for on adding sulphuric acid and starch to a solution of *pure* iodide of potassium, the blue colour is not produced; but if the specimen contain iodate of potash or free iodine, the blue colour will be developed."

[This subject had been previously brought under our notice. It appears that some iodide of potassium was recently condemned by a purchaser as bad, the manufacturer being told, to his astonishment, that it contained no iodine, the test described in the Pharmacopœia having failed to indicate the presence of that body. It was found, however, that the only peculiarity in the salt consisted in its being very pure. On adding sulphuric acid to a solution of pure iodide of potassium, water is decomposed together with the salt, yielding sulphate of potash and hydriodic acid, as represented in the following diagram:—



Hydriodic acid (H I) is a colourless compound which does not affect the colour of starch, and therefore, on adding starch to the above mixture the blue iodide of starch is not formed. But hydriodic acid is a very unstable compound; it speedily undergoes decomposition, iodine being set free, which colours the solution and gives the characteristic blue colour with starch. If, therefore, instead of adding the sulphuric acid and starch *together*, the acid be added first, and the mixture allowed to stand for some minutes before the addition of the starch, the presence of the iodine will be made manifest. It might be supposed that the same effect would ensue if the acid and starch were added simultaneously, and the mixture allowed to stand for some time, but experience shows that this method of applying the test will not answer.

It is evident from what has been stated, that the Pharmacopœia test is a bad one. Sulphuric acid is not the best substance to use for

decomposing the iodide of potassium and setting free the iodine. Nitric acid might be used with better success, especially if it contain nitrous acid, as it generally does; but chlorine water, or gaseous chlorine, will be found to be better than either, the whole of the iodine being thus instantly set free. The best method of applying the test is to make a weak solution of the salt to be tested in distilled water, to add to this some cold solution of starch, to allow some chlorine gas to flow from the mouth of a bottle on to the surface of it, and to slightly agitate the liquid. The blue compound will thus be instantly developed. It is not necessary that the chlorine used for this purpose should be pure; the gas occupying the upper part of a bottle containing chlorine water, will answer the purpose perfectly well, the stopper being removed, and the bottle partly inverted over the edge of the test-glass, so that the heavy gas may flow out. This is the most delicate way of testing for the presence of iodine, and should be adopted where the quantity to be detected is very small; but in applying the test to iodide of potassium, delicacy of indication is not required, as iodine is, or ought to be, the most abundant constituent of the salt. Chlorine water, or reddened nitric acid, might, therefore, be used in this case with the same effect as gaseous chlorine.

Our correspondent is correct in saying that the Pharmacopœia test does not indicate the purity, but the impurity of the salt. The test could not have been intended for the detection of impurities, but merely to show that iodine is present; yet it has happened, unfortunately, that when applied according to the instructions of the Pharmacopœia, it fails to afford even this indication, if the salt be perfectly pure. Perfectly pure iodide of potassium, however, is rarely met with in commerce. The process by which the salt is usually made by manufacturers, consists in heating together solution of caustic potash and iodine, in which case iodate of potash is necessarily produced at the same time as the iodide; and although the salt is subsequently exposed to a dull red heat, with the view of decomposing the iodate, yet there is generally a small portion of iodate left in the product, the presence of which causes the immediate liberation of iodine on the addition of sulphuric acid.

Thus, although the Pharmacopœia test is inefficient for the detection of iodine in pure iodide of potassium, yet it answers very well with the iodide usually met with in commerce, the characteristic re-action being caused by the presence of even a minute portion of iodate of potash, which would not interfere with the medicinal action of the salt.—Ed.]

ON THE EXISTENCE OF LACTIC ACID IN LIVING BODIES.

BY M. BERZELIUS*.

M. Liebig addressed a letter to the Academy of Sciences of Paris, which was read on the 17th of January, 1847, in which he said, "It has been long known that the flesh of fresh-killed animals possesses, very appreciably, the re-action of a free acid. M. Berzelius has attributed this re-action to the presence of lactic acid, but without the fact having been hitherto ascertained by analytic results in an unquestionable manner. Many chemists have admitted that lactic acid exists in urine, the gastric juice,

* Translated from Berzelius's *Annuaire*, 1848, p. 347.

and in milk; but they have supported this opinion by uncertain re-actions. The opinion, even, that lactic acid prevents the precipitation of oxide of copper by milk of lime is founded on error. M. Strecker has lately shown that pure lactate of copper is entirely decomposed by milk of lime, so completely that no re-agent whatever indicates a trace of oxide of copper in the liquor after precipitation. It is true that pure lactate of lime dissolves a little oxide of copper, but a slight excess of lime precipitates it again. The intention of my experiments was, to dispel the uncertainty which enveloped the non-volatile organic acid contained in the fluids of living bodies*."

M. Liebig afterwards announces, in the same letter, of which there will be occasion again to speak, that he has found this acid is the lactic acid. After having thus endeavoured to annihilate the labours of his predecessors on this acid which exists in the animal organization, and even the experiments on lactic acid by M. Pelouze, it is then to M. Liebig that science owes a debt of gratitude for having taught us that living bodies contain lactic acid.

I have myself too great a share in the discovery of lactic acid in living bodies, not to feel particular interest that the history of lactic acid in the animal organization should be stated with perfect truth.

In 1807† I analyzed the flesh of animals recently killed, and I found lactic acid in the fluids which I extracted from it. The question as to the nature of this acid was to be determined by experiment. The fluid, coagulated by heat and filtered, was evaporated to the consistence of a thick syrup, which was treated with alcohol. The alcoholic solution was mixed with dilute sulphuric acid as long as a sulphate was precipitated. The precipitate was separated by the filter, and the liquor was digested with carbonate of lead, till it contained oxide of lead in solution. After having separated the sulphate and chloride of lead by filtration, the fluid was treated with sulphuretted hydrogen and evaporated; it was strongly acid, but yellow. Supposing it might contain foreign matters, it was again treated with water and digested with oxide of lead, which swelled and produced a bulky basic salt. After this the acid was again evaporated. It deposited no crystals, but remained in the form of an acid syrup, which I did not succeed in rendering colourless. I prepared some salts, and found that it produced with lime and magnesia, granular crystalline masses. To satisfy myself as to the nature of the acid which I had obtained, I compared it with other acids known at this period; and I found that it most strongly resembled the acid found by Scheele in sour milk, and this I prepared on the occasion. I convinced myself of their perfect identity, and that the latter could not be better prepared in a state of perfect purity than that from flesh. I then asserted that the acid was lactic acid, precisely as M. Liebig now asserts, forty years afterwards. It appeared evident to me that lactic acid in the animal body ought to be considered as a product resulting from the use of the elements of flesh,—a product which circulated in the system, and which consequently would be found in the blood, and be finally evacuated with the urine. In my analysis of blood, which I undertook immediately afterwards, I also discovered the presence of lactic acid by an analogous process; but as the quantity which is found in it is but very small, I had some difficulty at first in acquiring complete certainty of its identity. The successive analyses which I performed by degrees, of fresh milk, urine, tears, saliva, bile, &c., all furnished me with lactic acid; the alkaline fluids in minute quantity, the acid ones, such as urine, milk and sweat, in larger quantity.

Confidence was generally placed in my statements, until L. Gmelin and

* *L'Institut*, No. 683, p. 38.

† *Fœrelæsningar, &c.*, Lectures on Animal Chemistry, ii. 172.

Tiedemann in 1826, in their excellent work on the act of digestion, asserted that this acid was the acetic. It could not have been difficult to distinguish a volatile acid from an acid which is not so ; but M. Gmelin thought that the acetic acid lost its volatility by combination with animal matter. This property, described by this chemist, obtained confidence ; and in all works which were published after this date, the acid in question was generally considered as acetic acid.

This event occasioned me to undertake a new series of researches on lactic acid, which was published in my Treatise on Chemistry, vol. iv., p. 577-585 (*Dresden*, 1831), in which I demonstrated that it was impossible to confound lactic with acetic acid, unless it be supposed that it is with respect to acetic acid, what sulphovinic acid is with respect to sulphuric acid ; and that even on this supposition it ought to be considered as a peculiar acid.

I then employed tartaric acid to precipitate the alkali ; and after having separated, by means of carbonate of lead, all the acids contained in the alcoholic solution, except the lactic acid, I precipitated the lead by sulphuretted hydrogen. The alcohol having been evaporated, and the solution decolorized by pure animal charcoal, I precipitated the lactic acid from it by digesting in it an excess of hydrate of tin. After having washed the precipitate and decomposed it in water by sulphuretted hydrogen, I obtained the acid in a much greater degree of purity.

The first article of the first volume of M. Liebig's *Annalen der Pharmacie*, 1832, is an extract from the above memoir. M. Mitscherlich discovered afterwards, in 1834, that the lactate of zinc is a slightly soluble salt, which crystallizes readily, and from which lactic acid may be obtained in a state of perfect purity.

During these discussions on lactic acid, which continued for several years, a scientific renown was acquired, founded on numerous brilliant discoveries, which was not slow in indicating that it would attain celebrity,—it was that of M. Liebig. In 1842 M. Liebig * openly proclaimed that he combined in his person so great an extent of knowledge acquired by innumerable experiments and practical results, that no person could in future, probably amass so much (*wie sie sich vielleicht nie in einem Individuum wieder vereinigen dürften*) ; and he undertook to initiate the human race in the chemical phenomena of living nature. This essay was entirely premature ; science did not then, nor does it yet possess, sufficient positive knowledge to lead to results worthy of reliance.

Since 1821 I have been called upon, in consequence of the duty which devolves upon me on account of the station which I occupy in the Academy of Sciences at Stockholm, to make an annual report respecting all the branches of chemistry, and I considered it as my duty to use every effort to exercise a sound and rigorous judgment. I have shown that in this essay M. Liebig stated probabilities, and often even some things which could not be so estimated, as demonstrated and incontestable truths. I therefore put myself in opposition to this unrestrained chemical authority. Considering the height to which M. Liebig thought himself raised, an apology would have been superfluous ; any one who had the audacity to dare to make an objection was considered as guilty ; and the punishment consisted in entirely censuring his labours on other subjects, of which the school of Giessen endeavoured to nullify the results, in order to diminish the reputation of the author. This is the motive which determined M. Liebig to cause several of my labours to be refuted by his pupils in the laboratory of Giessen.

The existence of lactic acid in the animal fluids was one of these labours.

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* *Ann. der Chemie und Pharm.*, xli. 373.

The refutation of it was committed to M. Enderlin, who stated formally, that it was on the invitation of M. Liebig that he had undertaken it. The following are the terms in which he discloses the fact that he had been called to demonstrate by his experiments :* "It is absolutely impossible to admit of the existence of lactic acid in the bodies of these animals (*Carnivora*) *for this acid has not yet been found*, and their food does not contain any substance which can give rise to it." †

It is evident that the results of his experiments were to agree with the commission which he had undertaken. He demonstrated that he found none. Up to this point the master might, apparently at least, defend himself, if the result should be found to be inexact, by saying that the pupil had committed a mistake ; but he appears to have thought that M. Enderlin's process was not sufficiently decisive, and he undertook the demonstration himself. M. Liebig has declared ‡ that the experiments of M. Enderlin had proved that no animal fluid contained lactic acid, that he had himself sought to confirm and corroborate this result by the analysis of fresh and putrified urine, and that he had not succeeded in finding it. He took all possible pains to show to what extent my experiments were unsatisfactory, and he expresses himself in this respect as follows § : "Wenn man die von Berzelius angestellten Versuche, aus denen er die Gegenwart der Milchsäure im Harn erschlossen hat, näher beachtet, so ergiebt sich aus keinem derselben ein Beweis, dass sie einen Bestandtheil des frischen Harns ausmacht."

In the two papers of MM. Enderlin and Liebig which have been cited, lactic acid was merely a pretext. All the experiments were directed to the purpose of not finding lactic acid ; and the principal intention was evidently that of showing that the data which I had published were inexact. Did they wish simply to revenge themselves for the opposition which I offered ; or did they hope that by treating one of my labours in this way, that I should be induced to make a kind of confession in order to avoid the censure of the Giessen school with respect to my other labours ? I shall not decide this question.

M. Liebig attained his end, that of causing it to be believed for some years, that living bodies contained no lactic acid. And who could have imagined that this scientific *farce* would have terminated by M. Liebig himself discovering that lactic acid exists in the animal fluids, when I had proved it forty years before him ?

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* *Ann. der Chem. und Pharm.*, xlvi. 166.

† "Es ist durchaus unmöglich das Vorhandensein der Milchsäure in dem Körper dieser Thiere (*Carnivora*) vorauszusetzen, *da sie bis jetzt noch nicht darin gefunden worden ist*, und die Nahrung keine Substanz enthält aus der sie enstehen könnte."

‡ *Ann. der Chem. und Pharm.*, l. 163.

§ "When the experiments by which Berzelius has ascertained the presence of lactic acid in urine are closely examined, we arrive at the conclusion that no one of them offers a proof that this acid is a constituent of fresh urine."

It is not uninteresting to give here, with respect to these data, the terms employed by M. Liebig on the 21st December, 1846, in announcing to the Chemical Society of London that he had discovered lactic acid in living bodies : "After overcoming more difficulties than I have ever experienced in any investigation, I have for the first time indisputably proved that free lactic and phosphoric acid exist in the whole organism wherever muscle is found. How curious, that in the absence of all proofs on the part of the opponents of lactic acid, I should now demonstrate to them its existence in the flesh of oxen, fowls, calves, and sheep."—*Phil. Mag.*, vol. xxx. 1807, p. 412.

M. Pelouze had indicated a re-action, by means of oxide of copper and hydrate of lime, by which the presence of lactic acid might be discovered. M. Boussingault employed this re-action to prove that an acid which he found in urine was lactic acid. But for the purpose of also destroying this re-action, before having ascertained the presence of lactic acid, M. Liebig caused it to be proved by M. Schlieper, one of his pupils in the Giessen laboratory, that M. Pelouze had deceived himself, and that his method was inapplicable. I have satisfied myself that the re-action described by M. Pelouze for the detection of lactic acid is perfectly correct ; but I have at the same time found, that if proper precautions be not adopted, the end may be completely missed.

After M. Liebig was convinced by his own experiments that living bodies contain lactic acid, he did not endeavour to excuse the errors which he and his pupils had committed respecting the existence of this acid. Instead of this, he did all that he could to reduce the labours of his predecessors to mere attempts of insufficient re-actions and unfounded hypotheses, in order to appropriate the whole of the discovery to himself. This mode of acting is unprecedented in the annals of science. M. Liebig has endeavoured not to be surpassed in this respect.

In former annual reports I have mentioned the attempts made by M. Liebig to annul the results at which I had arrived with regard to lactic acid by long and laborious researches, submitted to frequent fresh examinations. On these different occasions no expression of discontent escaped me, for I never felt it ; and the less so, because I was thoroughly convinced that what is true remains so, although sometimes for a certain period success may attend attempts to prove that it is not so. The reasons for which I have now entered upon the question in a serious point of view, are, on one hand, the circumstances which have occurred in stating the question by M. Liebig's manner of proceeding, and on the other hand the position taken up by M. Mulder, for an analogous cause, against M. Liebig. After M. Mulder felt himself compelled to enter the lists against the adherent of peace in science, it would be pusillanimous to leave him alone in this noble combat, in which his arms were an ardent desire for the right and for truth,—arms which all those ought to bear seriously who cultivate science, and which they ought not to put off till respected by those against whom they were employed. It is my conviction that it is the duty of all true friends of science to unite their efforts for the extirpation of the root of this moral tare, which has begun to invade and domineer in the peaceful domain of science.—*Philosophical Magazine.*

REMEDY FOR CHOLERA.

The following advertisement appeared in the *Times* of August the 24th : "A very valuable prescription for the effective Cure of that malignant plague the Cholera, received from J. Booker, Esq., H.B.M.'s Vice-Consul at Cronstadt, Russia, may be obtained, gratis, on application, between the hours of 10 and 5, to Mr. Tomlin, 2, Copthall-buildings (end of Angel-court), Throgmortou-street, City." On applying at the specified address, we obtained a printed paper, of which the following is a copy :—"Gratis. Valuable prescription for the effective Cure of the Cholera, by J. Booker, Esq., H.B.M.'s Vice-Consul at Cronstadt, Russia. 'The principal part is to attack the disease the instant it is suspected, take a stimulating dram, with peppermint, and a few drops of laudanum, cover yourself up as warm as possible, to promote perspiration, apply hot substances, such as water, bran, salt, or even sand to the limbs, and put a mustard-poultice over the whole stomach. As soon as perspiration breaks out, and the beating of the

pulse is restored, the complaint may be looked upon as conquered ; if it is neglected till its last stage, recovery cannot be expected.' As it appears very probable that we shall soon be visited by that dreadful malady, and that thousands are carried off before medical assistance arrives, by strictly attending to the above simple yet efficacious means, no person need fear fatal consequences. W. Tomlin, No. 2, Copthall Buildings (end of Angel Court), Throgmorton Street, London."

EXPLOSION OF GAS IN ALBANY STREET.

On Monday evening, August the 7th, a fearful explosion took place in Albany Street, of which the following is the account from the *Times* of August 9th :—

" It appears from the statement of Mrs. Loten, the occupier of the house, No. 60, Albany Street, that Mr. Loten, and herself and infant child, had been out of town since Monday night, and had left her house in care of Captain John Loten, Mr. Loten's brother, and Miss Bird, her sister. She had seen them both in University College Hospital that morning, and their statement was, that after the shop (established for the sale of Berlin wool) was shut up on Monday night, Mr. Loten turned off the gas, and they then went up stairs to the sitting room. A few minutes before ten o'clock the servant informed them that supper was ready, and they came down to the back parlour adjoining the shop with a candle. The servant went out to get some wood, and told the nurse, Mary Bently, to stand at the private door whilst she did so. There was no one else in the house at the time. During this interval Miss Bird opened the shop door from the back parlour, and at that instant the explosion took place, Mr. Loten and Miss Bird being blown through the parlour window into the back yard, and the entire front of the premises was also blown out, the deceased Mary Bently being carried by the violence of the shock on to the pavement of the opposite side of the street, where she was picked up dead.

" For more than a quarter of a mile in each direction the effects of the shock have been felt, and in Albany Street, from Chester-gate, on the western side, to Sir Felix Booth's distillery, and on the eastern side, from William Street to the further side of Cumberland Market, there is scarcely a house that has not nearly every window it contained broken more or less. The Windsor Castle, at the corner of Ernest Street, as well as the houses right and left of No. 60, as also those on the opposite side of the street, are a perfect wreck. The most extraordinary effects of the explosion are, however, exhibited at the house of Mr. Gibbon, No. 103, Albany Street, immediately facing the house destroyed ; not only is a portion of the brickwork in the rear of the house disturbed, but portions of the roof and back windows have been blown over Chester Mews, and against the rear of the houses in Chester Terrace—a distance of 200 or 300 yards. The houses in Ernest Street and the workshops in Little Albany Street, as also the Albany Street police-station, have sustained great damage. As a further evidence of the violence of the explosion, the pavement was torn up for several yards, and a private house, No. 104, in the occupation of Mr. Hill, has the iron railings round the area snapped asunder."

According to the official reports made to the insurance offices, the number of houses injured amount to no less than 103 ; and the total damage is calculated at little short of £20,000.

We were preparing some observations to be appended to the above account, with the view of explaining the cause of gas explosions, when the following paper, which appeared in the *Medical Gazette* for August 26, came under our notice. The subject is so fully and well explained by Mr. Taylor, that it has left nothing to be added.

ON GAS EXPLOSIONS IN HOUSES.—CAUSE OF THE EXPLOSION, AND SUGGESTIONS FOR ITS PREVENTION.

BY ALFRED S. TAYLOR, F.R.S.,
Lecturer on Chemistry in Guy's Hospital.

While much has been said and written on the subject of explosions in mines, but little attention has been paid to the danger which may arise, through accident or from carelessness, by the use of coal-gas for the purpose of lighting houses. Explosions have occasionally taken place, but these have been, for the most part, slight, and productive of no danger to life, and of but little damage to property. The explosion which recently occurred in Albany Street was perhaps one of the most formidable and disastrous in its effects of any that have been recorded since coal-gas was used for the purpose of artificial lighting.

Popular errors.—There is unfortunately much popular ignorance on the subject. Many persons cannot realize the fact that they are deriving light from the combustion of *fire-damp* ; and although the journals not unfrequently contain accounts of the most fearful accidents occurring in coal-mines, the public are unwilling to believe that they are exposed to any similar risk by the introduction of gas into houses ; yet, as the recent deplorable occurrence testifies, accidents of a most alarming kind may occur, unless great precaution be used. We have heard it, indeed, gravely questioned by well-informed persons whether coal-gas could produce, by its explosion, such an amount of destruction as was caused on this occasion—and gun-cotton and gunpowder have been appealed to as the more probable sources of the accident. Such an opinion only tends to increase the liability to accidents, by diverting attention from the real cause. Gun-cotton and gunpowder act only in producing *gaseous* matter ; and when compared with an explosive mixture of gas, their effects are, *cæteris paribus*, far less sudden and tremendous. The entire destruction of a vast coal-mine, with the lives of one hundred persons, by a single explosion of *fire-damp*, should at least teach those who are willing to fly to any explanation rather than the true one, that the explosive force of a mixture of gas with air, when ignited, is quite adequate to explain the occurrence of any amount of destruction. When they are told that there is, chemically speaking, no difference between the fire-damp of mines and that mixture which is speedily made by allowing unburnt gas to escape into a shop or room through a jet, a damaged pipe, or a defective gas-meter, they may then be led to perceive their mistake. To those who know and have experienced, even on a small scale, the effects produced by the ignition of a mixture of hydrogen and oxygen, or of coal-gas and oxygen, it is unnecessary to say a word on so simple a matter.

Composition.—The coal-gas supplied to houses is of very variable composition : it consists of a number of inflammable gases and vapours, all of which, when mixed with a certain proportion of air, are liable to explode with tremendous force. The common purified coal-gas is composed of light carburetted hydrogen, olefiant gas, carbonic oxide, hydrogen, nitrogen, the vapours of naphtha, and bisulphuret of carbon.* In the process of puri-

* The smell of coal-gas is owing to the presence of these vapours and of some sulphuretted hydrogen. The light carburetted hydrogen, olefiant gas, and hydrogen, when pure, are free from any odour. Gas cannot be deprived entirely of sulphuretted hydrogen without losing much of its illuminating power ; and there is no process known by which it can be entirely freed from the vapour of bisulphuret of carbon. It is owing to the presence of these bodies that coal-gas, while burning, produces sulphur-

fication by lime, the gas loses in great part, but not entirely, the sulphuretted hydrogen and carbonic acid which enter into its composition as it first escapes from the retort during distillation.

A pound of coal will give four and a half cubic feet. The composition of the product, when fit for use, varies according to the period at which the gas is collected.

	At the beginning.	After 5 hours.	After 10 hours.
Light carburetted hydrogen	82.5	56.	20.
Olefiant gas	13.	7.	0.
Hydrogen	0.	21.3	60.
Carbonic oxide	3.2	11.	10.
Nitrogen.....	1.3	4.7	10.
	100.	100.	100.
Specific gravity.....	0.65	0.5	0.34

The amount of hydrogen goes on increasing in proportion to the duration of the process, and the explosive power of the gas thereby becomes increased.* It is also worthy of remark, that the gas, even in the beginning, is but little more than half as heavy as the atmosphere. It is, therefore, very light, and in all cases tends to ascend in an apartment—a fact easily demonstrated by experiment. This ascensional power is greatest in that gas which is collected after a ten hours' distillation.

Explosive proportions.—It has been already observed, that the whole of the gases of which coal-gas consists, with the exception of nitrogen, are highly explosive when mixed in certain proportions with atmospheric air. The vapours of naphtha and bisulphuret of carbon are also explosive under these circumstances ; and when the coal-gas ascends through a stratum of air in a closed apartment, this explosive mixture becomes speedily formed.

In a well-closed room, if not of a very large size, every portion of air would, in the course of a short time, become explosive by admixture with the light coal-gas. Owing to a peculiar law which regulates the diffusion of gases, they tend, notwithstanding the greatest differences in their specific gravities, to mingle uniformly in all proportions. This is proved, with respect to coal-gas, by the smell being equally perceptible in every part of the room.

The exact proportion of air required to produce the greatest amount of explosion has not been accurately determined. It is customary to refer to the experiments of Sir H. Davy on light carburetted hydrogen ; but it is obvious, from the very variable proportion of this compound in coal-gas, and the presence of other inflammable gases and vapours, that the results obtained by this excellent chemist cannot be strictly applied to mixtures of coal-gas and air. They are however, probably sufficiently near the truth for all practical purposes. If the gas be in too large or in too small a proportion, there will be no explosion. Sir H. Davy found that, when one volume of gas was thoroughly mixed with *one*, *two*, or *three* volumes of air,

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ous acid, which is not only offensive to respire, but very injurious to furniture. The library at the Athenæum Club was some years since extensively damaged by the sulphurous (becoming sulphuric) acid evolved from the gas-burners. In consequence of this, Mr. Faraday suggested an ingenious plan of burning gas and at the same time carrrying off the products of combustion by means of a tube.

* According to an analysis, made by M. Tourdes, of coal-gas which had occasioned the deaths of four persons at Strasburg, it consisted in 100 parts, of 31 hydrogen, 22.5 light carburetted hydrogen, 21 carbonic oxide, 14 nitrogen, and 6 of olefiant gas, with some carbonic acid.

the mixture did not explode, but was merely burnt or consumed. When the gas formed from one-*fifteenth* to one-*thirtieth* part of the mixture with air, it did not explode, but the candle burnt with an increased flame. The explosive proportions are those in which the gas forms from *one-sixth* to *one-fourteenth* part of the mixture, and the greatest explosive power was manifested when *one* volume of gas was mixed with *seven* or *eight* volumes of air. In the coal-gas examined by M. Tourdes, it was found that, in order to render it explosive, it was necessary to mix it with *eleven* volumes of air.

Conditions which modify the explosive force.—In the exertion of this explosive force, much depends on the completeness with which the gases are mixed, and this must be regulated by the time during which they have been in contact. I have safely ignited a mixture of fifty cubic inches of oxygen and olefiant gas in a glass vessel when the mixture had not been made for more than a few minutes; but in one experiment in which the gases had been in contact for several hours, a large glass vessel which contained one hundred cubic inches, was, on the approach of a lighted candle, shattered to dust. The largest piece of glass which could be found after the explosion, did not measure more than a quarter of an inch.

The explosive power of coal-gas derived from a distillation of some hours' duration, becomes greatly increased by reason of the free *hydrogen* which it contains. In gas collected after ten hours, the proportion of hydrogen amounts, according to Mitscherlich, to no less than *sixty per cent.* The dangerously-explosive properties of this kind of coal-gas (chiefly used in aërostation) may be estimated from the fact discovered by Davy, that *fifty* cubic inches of coal-gas at its maximum of explosive power (*i.e.* eight volumes of air to one of gas), did not produce so loud a report as *five* cubic inches of a mixture formed of two parts of atmospheric air and one of hydrogen. It was also discovered by Davy, that the presence of carbonic acid and nitrogen in an explosive mixture of light carburetted hydrogen and air, tended to diminish the force of the explosion. In the mixtures which are liable to occur accidentally in houses, this counteracting effect is not likely to operate to any material extent.

Degree of heat required for explosion.—Sir H. Davy found that an iron rod, at the highest degree of red heat, did not inflame explosive mixtures of fire damp and air, but flame kindled it directly. With respect to the coal-gas of shops, I have repeatedly ascertained by experiment, that the dull red heat of paper, saturated in nitre and ignited, will not inflame or explode it. A poker or bar of iron heated to moderate redness, inflames it immediately*. This difference may be probably owing to the presence of hydrogen, olefiant gas, and the vapours of naphtha and bisulphuret of carbon, all of which are kindled by a degree of red heat which would not kindle the mixture of fire-damp and air in coal-mines. Accidents in houses are generally occasioned by the flame of a candle.

Cause of the explosion.—It may be observed that the cause of the explosion is the sudden concussion of the air. If any of these explosive mixtures be ignited by the aid of the electric spark in vacuo, in glass vessels of great strength, a bright flash of light is observed to pervade the whole of the vessel: but there is no report, or only a very slight sound, at the moment of the discharge. It is well known to Chemists, that water

* This experiment also serves to illustrate the extraordinary lightness of coal gas, especially after it has stood some little time. The glass jar containing the gas should be opened with its mouth downwards, and a piece of dry nitre paper ignited should be gradually raised in it. The thick smoke floats at the lowest level of the jar, and does not rise into the upper part of the vessel, which is filled with the light coal gas.

and carbonic acid are the chief products—the carbon and hydrogen of the gas and inflammable vapours suddenly and instantaneously combine with the oxygen of the air, and the nitrogen is at the same time set free. It is the sudden expansion of the mixture, during this chemical change, which produces that terrific vibration of the air indicated by the report.* Thus, if a soap-bubble, filled with the mixture of gas and air be exploded while floating in the air, the force of expansion will blow out a candle at some distance from it. If the mixture be exploded in a bottle loosely corked (a dangerous experiment), the cork is always blown out.† This silent expansion of the gases at the moment of combination can be easily witnessed and measured in strong glass tubes, graduated for the purpose. Experiments on the degree of expansion during the explosion, can only be performed on a small scale; and it has been found that in a small tube, the volume is, at the moment of greatest expansion, *tripled*. There can be no doubt that when some hundreds of cubic feet are kindled, the expansion is much greater than this.

The late accident.—From what I have been able to ascertain by inquiry of a surveyor who knew the house, the room in which the explosion occurred had a capacity of 1620 cubic feet. If the coal-gas were entirely light carburetted hydrogen, the quantity required to give this volume of air its maximum explosive force, would be from about 100 to 200 cubic feet. The mixed nature of coal-gas renders it impossible to say what number of cubic feet must have escaped in order to render the air of such an apartment explosive. If the apartment were of less dimensions, or only a part of the air in the room was rendered explosive, then the escape of a smaller quantity of gas would have explained the result. If the coal-gas contained much hydrogen, a much smaller quantity of it escaping under water pressure, which is generally kept on during the night, would equally account for the accident; since the explosive force of such a mixture has been proved to be ten times as great as that of coal-gas and air. How, or in what way the coal-gas escaped into the apartment, it is here unnecessary to inquire. The ignition of from 500 to 1,000 cubic feet of a mixture of this kind, would fully and satisfactorily account for the extensive destruction caused on this occasion. This will be fully understood by those who have witnessed the explosive power of 100 cubic inches of the mixed gases.

Test of the presence of such dangerous mixtures.—The smell of coal-gas is an excellent test of its presence. It may be perceived when the gas is mixed with air in far less than an explosive proportion. The smell has been found to be very perceptible when the gas formed only the 1-150th part of the mixture, and it was still strong when diluted with 500 volumes of air. When in an explosive proportion, the odour is exceedingly powerful; there is, therefore, fair warning of the possible occurrence of danger. The presence of any odour indicates a leakage, which is always liable to increase when the pressure is put on at night, and the gas is not burning. It is proper to remark, that less than an explosive proportion may act as a *poison* if it be respired for some hours. There are reports of six deaths on record, where persons have been thus killed by sleeping in rooms near

* This experiment may be safely performed by forcing from a bladder fifty or one hundred cubic inches of the explosive compound into a wide basin, containing a mixture of soap and water. The vessel should be filled to the rim with the soapy liquid: any portion unprotected by the water is liable to be blown off, and give rise to an accident.

† In the delivery of chemical lectures, these accidents are liable to occur. I have known a cork and glass tube blown in this way to a height of fifteen feet, by the ignition of a few cubic inches of an explosive mixture contained in a bottle.

to which there was a leakage of gas. M. Tourdes found that an atmosphere containing *one-thirtieth*, or even *one-fiftieth* part of coal-gas, seriously affected animals. It cannot be too strongly impressed upon the minds of those who use gas in dwelling-houses, that where a smell is perceptible, the defect should be immediately found out and remedied. When the leakage is comparatively slight, it may endanger the lives of those who sleep in or near the spot, and when it has reached a higher point, it may lead to a serious accident by explosion.

Prevention of accidents.—The observance of a few simple rules would suffice to prevent accidents : 1. The gas should be commanded by *two* well-fitted *stop-cocks*, one at the main and another at the burner. 2. *No smell* of gas should be perceptible in the room after it has been turned off. Any escape of gas will easily be detected by the smell, if the room be closed for a short time. This should not be suffered to continue, as it is a clear proof of some defect. Gas will escape through the minutest apertures or chinks. 3. The *free access of air* to the room, by leaving the door open. It would be proper, if possible, to leave a portion of the window down, or to have one of the upper panes of glass removed, and a pane of perforated zinc substituted. A hole in the shutter might allow of the communication with the outer air. The free ventilation of a room in which gas has been burning, is advisable under all circumstances, as it tends to remove the air vitiated by combustion. In the event of any leakage it will, by leading to the extensive detection of the gas, tend to prevent the formation of an explosive mixture. If it be inconvenient to procure ventilation by the door or window, an aperture made into the chimney near the ceiling, and protected by a closed valvular plate, which would admit of being drawn down when the gas is turned off, would tend to prevent a dangerous accumulation. The light gas would find its way into the chimney, and its escape would be aided if the inner door of the apartment were left open. 4. When a smell is perceived, although slight, in or near a room supplied with gas, it would always be a safe precaution to extinguish any light, and open the doors and windows for a short time before venturing near the spot with a lighted candle.

It will be seen, therefore, that the great principle of safety, is to have a free ventilation, especially at the *upper part* of every room which is supplied with gas. If, in a small room, there be a leakage, which is neglected, and the doors and windows be completely closed for two or three hours, it is certain that there will be formed a most dangerous explosive mixture, which only requires the approach of a lighted candle to produce such a fearful accident as that which has been lately witnessed. It is the illustration of the fire-damp in mines on a small scale, with the difference, that while the miner cannot prevent the accumulation of the gas from the coal strata, and he cannot secure a perfect ventilation, the gas burner has it in his power to adopt both of these precautions. In most shops there is tolerably free ventilation : hence accidents from coal-gas are by no means common.

ON THE VARIOUS APPLICATIONS OF GUTTA PERCHA.

BY MR. WHISHAW.

At a meeting of the British Association, Mr. Whishaw read a paper giving an explanation of the various applications of gutta percha; numerous specimens of which in the shape of thread, cord, tubular staves, driving bands, constables' staves, sticks, whips, inkstands, medallions, shields, water buckets, stereotype plates, and almost every other description of article both useful and ornamental, were present. The paper, after stating that gutta percha was the concrete juice of a large tree of the same name, abounding in Borneo, &c., obtained by tapping

the tree periodically by the Malays, stated that its introduction into this country was purely accidental; Dr. Montgomery having transmitted the first sample of it to the Society of Arts in 1843, at which time he (Mr. Whishaw) was Secretary to that Society. The first articles of use made of gutta percha in this country were laid before the Society of Arts in 1844, and consisted of a lathe-band, a short length of pipe, and a bottle-case, which he had himself made by hand, having caused the concrete substance to become sufficiently plastic by immersing it in hot water. He also produced casts from medals, which attracted considerable attention at the time, and surgical instruments were soon after made of this new material. It was also adapted to commercial uses; and from the period mentioned to July 11th in the present year between 600 and 700 tons had been imported for the Gutta Percha Company. From twenty to sixty tons were now regularly imported every month. Contrary to the general opinion that gutta percha is a simple, hydrogenous substance, Mr. Crane (chemist to the Gutta Percha Company) found it in its ordinary state to consist of at least two distinct materials, besides a notable proportion of sulphur—viz., 1. A white matter, gutta percha in its pure state; 2. A substance of a dark brown colour. Various experiments were made to ascertain its strength when mixed with other matters, and also as to what pigments would mix with it without rendering it brittle or deteriorating its qualities. From these it appeared that the only pigments that could be altogether relied on to be used with gutta percha were orange lead, rose pink, red lead, vermilion, Dutch pink, yellow ochre, and orange chrome. Under the influence of heat and pressure, gutta percha would spread to a certain extent, and more so if mixed with foreign matters. All the mixtures composed of gutta percha and other substances which had been subjected to experiment, except that containing plumbago, were found to increase its power of conducting heat; but in its pure state gutta percha was an excellent non-conductor of electricity. The best composition for increasing the pliability of gutta percha was that formed in conjunction with caoutchouc tar, and next in order that of its own tar; and the best material at present known for moulding and embodying was obtained by mixing gutta percha with its own tar and lamp black. In describing the process of manufacturing gutta percha, the author observed, that rude blocks of the material were first cut into slices, by means of a cutting machine formed of a circular iron plate of about five feet in diameter in which there are three radical slots furnished with as many knives or blades. The blocks are placed in an inclined shoot, so as to present one end to the operation of the cutters. The slices are then placed in a wooden tank, containing hot-water, in which they are left to soak until found in a plastic state. They are afterwards passed through a mincing cylinder, similar to that used in paper mills for the conversion of rags into pulp, and then thoroughly cleansed in cold water tanks; the water, in cases of impure gutta percha, being mixed with a solution of common soda or chloride of lime. It is next put into a masticating machine, such as is used in the manufacture of caoutchouc, and then pressed through rollers; thus being converted into sheets of various width and thickness. When necessary the sheets are again masticated, and again passed through rollers. These sheets are subsequently cut into boards by vertical knives, placed at the further end of the table, along which the sheets are carried by a cloth or web to another roller, round which they pass, and are cut into the required widths. The bands or straps are then removed and coiled up ready for use. Driving bands for machinery are thus made, and shoe soles and heels are stamped out of similar sheets of gutta percha. In making tubes or pipes, either of gutta percha or any of its compounds, a mass of gutta percha, after being thoroughly masticated, is placed in a metal cylinder

furnished with a similar piston, by which it is pressed down into an air-box, kept hot by steam, which has at its lower end a number of perforations, through which the plastic material is forced into a cup, whence it passes out, round a core, into the desired tubular form, and thence through a gauge to the required size, and into a receiver of cold water, being drawn to the other end of a long trough by a cord passing round a pulley at the far end of the trough, and returning to the person in attendance on the machine, who gradually draws the pipe away from the air machine. Thus tubes of considerable length and diameter are made to a very great extent, and are used for the conveyance of water and other liquids, and are now under test for the conveyance of gas. The paper next explained the variety of articles already made of gutta percha, which were of three classes—1. Useful; 2. Ornamental; and 3. Useful and Ornamental combined. Various articles were then exhibited, including two very handsome shields, and a splendid communion dish and service. Mr. Whishaw next exhibited the Tclakouphanon, or Speaking Trumpet; and in doing so, said that speaking tubes of gutta percha were quite new, as was also the means of calling attention by them of the person at a distance, which was accomplished by the insertion of a whistle, which being blown, sounded at the other end quite shrilly. Attention having been thus obtained, you remove the whistle, and by simply whispering, the voice would be conveyed quite audibly for a distance of at least three quarters of a mile, and a conversation kept up. It must be obvious how useful these telegraphs must become in large manufactories; and indeed in private houses they might quite supersede the use of bells, as they were so very cheap, and by branch pipes could be conveyed to different rooms:—and, indeed, if there were no electric telegraphs, they might, by a person being stationed at the end of each tube of three quarters of a mile or a mile, be made most speedily to convey intelligence for any distance. In private houses the whistle need not be used, but a more musical sound could be produced. He then amused the auditors by causing the end of the tube, which was of the length of 100 feet, to be inserted into the mouth-piece of a flute held in a person's hand, regulated the notes, and placing his own mouth at the other end of the tube, "God save the Queen" was played at a distance of 100 feet from the person giving the flute breath. Turning to the Bishop of St. David's, he said that in the event of a clergyman having three livings, he might, by the aid of three of these tubes, preach the same sermon in three different churches at the same time.—Mr. Whishaw also exhibited the gutta percha submarine rope or telegraph; which consisted of a tube perforated with a series of small tubes, for the conveyance of telegraphic wire, and which, for the purpose of preventing its being acted upon by sea water or marine insects, was banded or braided round by a small rope, and its being perfectly air-tight would render it quite impervious to the atmosphere.—*Athenæum.*

ON COMMON SALT AS A POISON TO PLANTS.

BY MR. W. B. RANDALL.

The following notice is presented as being likely to afford a useful practical caution to those interested in the cultivation of plants. In the month of September last, three or four small plants in pots were shown to the writer, nearly or quite dead; and he was, at the same time, informed that their destruction was a complete mystery to the party to whom they belonged, and that Dr. Lindley had expressed his opinion, from the examination of a portion of one sent to him, that they were poisoned. Having searched in vain for any strong poison in the soil, and in the plants themselves, he inquired more minutely into the circumstances of the case, and

found that these were only specimens of many hundreds of plants both in the open air and in greenhouses (but all in pots) which exhibited, in a greater or less degree, the same characteristics. The roots were completely rotten, so as to be easily crumbled between the fingers ; the stems, even in young plants, assumed the appearance of old wood ; the leaves became brown, first at the point, then round the edge, and afterwards all over ; while the whole plant drooped and died. At least 2,000 cuttings in various stages of progress, and 1,000 strong, healthy plants, had been reduced to this condition ; including different varieties of the fir, cedar, geranium, fuchsia, rose, jasmine, and heath. The sight of this wholesale destruction, coupled with the fact that the whole were daily watered from one particular source, suggested the conclusion that the cause of the evil must reside in the water thus used ; and this was accordingly examined. It yielded the following constituents, making in each imperial pint of 20 fluid ounces, nearly 9½ grains of solid matter entirely saline, without any organic admixture :—

Carbonate of lime	0.600
Sulphate of lime	0.462
Chloride of calcium	0.200
Chloride of magnesium	1.252
Chloride of sodium	6.906
	9.420

The mould around the plants and an infusion of the dead stems and leaves also afforded abundant evidence of the presence of much chloride of sodium. Further inquiry showed that the well from which the water was procured had an accidental communication, by means of a drain, with the sea ; and had thus become mixed with the salt water from that source, and had been used in this state for some weeks, probably from two to three months. From about that time the plants had been observed to droop ; but it was not until nearly the whole of a valuable stock had been destroyed, that any extraordinary cause of the evil was suspected. To place it beyond doubt that the water was really the cause of the mischief, twelve healthy fuchsias were procured from a distance and divided into two parts ; half being watered morning and evening with the water in question, and the others with rain-water. In a week, the six plants watered from the well had turned brown, and ultimately died, while all the rest remained perfectly flourishing. Assuming, from these facts, that the common salt in this water was the chief cause of the results described, it is proved that water containing about seven grains of salt in each pint is, in its continued use, an effectual poison to the weaker forms of vegetation ; or that when a soil is continually watered with a weak solution of salt, it gradually accumulates in it until the soil becomes sufficiently contaminated to be unfit to support vegetable life. In either case an interesting subject of inquiry is suggested—What is the weakest solution of salt which can produce in any measure this poisonous effect ?—or, in other words, at what degree of dilution does the danger cease ? For salt is an important natural constituent of much spring water, quite independent of any infiltration from the sea, as in this instance. Thus :—the water of the artesian well, Trafalgar Square, London, contains in each gallon about 20 grains ; that at Combe and Delafield's Brewery 12.7 ; that at Wolverton Railway Station 6 ; one lately sunk at Southampton, for supplying a private manufactory, 40. May it not be asked, whether the subject of the suitableness of waters in general for the various purposes to which they are applied—be it in manufactures or for steam-engines, domestic purposes or drinking—is not worthy of a greater share of scientific attention than it has hitherto commanded.—*Athenæum.*

NOTICES OF BOOKS.

A Course of Lectures on Dental Physiology and Surgery, *delivered at the Middlesex Hospital School of Medicine.* By John Tomes, Surgeon-Dentist to the Middlesex Hospital. 8vo, pp. 397. Illustrated with 135 Engravings. London: John W. Parker, West Strand.

These lectures, which were originally published in the *Medical Gazette*, at intervals during the years 1845, 6, and 7, have now assumed the form of a complete and scientific treatise. Although the title of the work would imply that it is addressed to the medical profession, the substance of it is calculated to interest and instruct the general reader, and especially those who are at all familiar with scientific pursuits. In the description of the structure, composition, and physiology of the teeth, the author has illustrated his subject with numerous well-executed engravings, some of which are microscopic representations of the parts under consideration. The diseases of the teeth and gums are treated of at some length, and the remedies as well as the various operations of dental surgery are described. The use of anæsthetic agents is also noticed; with precautions respecting their application, and the cases in which they should be avoided.

The work is altogether of a higher order than the treatises usually met with on this subject; it is calculated to be of real use to the student, and it has a copious index for the convenience of the general reader who may desire information on any matters relating to the teeth.

A Letter to the Chairman and Weekly Board of the Middlesex Hospital, *on the Operation of the 23d Rule of the Hospital, regulating the Qualification for the Assistant Surgeoncy.* By H. Burford Norman, F.R.C.S., late candidate for the above office. London: G. Odell, Princes Street, Cavendish Square. 8vo, pp. 16.

The 21st rule of the medical department of the hospital enacts,

"That every Surgeon eligible to this hospital, be a Member of the Royal College of Surgeons of London: that he shall not have practised as an Apothecary or as an Accoucheur for at least ten years before the vacancy shall have occurred, nor shall he so practise during his continuance in office in the hospital."

The 23d Rule requires,

"That candidates for the office of Assistant Surgeon produce the same testimonials of qualification as are required by the laws of the hospital from a candidate for the office of Surgeon to the hospital."

It is a principle generally acted upon in hospitals and dispensaries, that the office of Surgeon requires the services of a practitioner who has devoted his time to pure Surgery, and inasmuch as the engagement in general practice is calculated to divert the attention from the normal duties of a Surgeon, such practice constitutes a disqualification. According to the rules of the St. Marylebone Dispensary, "every candidate for the office of Surgeon must be a Member of the Royal College of Surgeons of England, not engaged in the practice of Midwifery or Pharmacy." In the Middlesex Hospital, the principle is carried further, the rule being retrospective to the extent of ten years.

This is the ground of Mr. Norman's complaint; but his pamphlet does not explain clearly his position, and the points upon which his

disqualification is founded, which may be better understood by the following *Report* of the *Medical Committee*, Dec. 23, 1847 :—

"Mr. H. Burford Norman offered himself a candidate for the office of Assistant Surgeon.

"The Medical Committee regret that they cannot recommend Mr. Norman as a candidate, in consequence of paragraph 21, page 35, of the laws of the Hospital.

"Mr. Norman admitted that he had been associated in practice with a gentleman who was an Apothecary and Accoucheur—that both of their names had been placed over the door—that the bills had been issued in their joint names—that the medicine was dispensed from their house of business—and finally, that he had shared one-half of the profits of the establishment—*and this within the last ten years.*"

It was argued by Mr. Norman at the time, that he had never been engaged in the practice of Pharmacy or Midwifery; and that the arrangement with his partner was purposely regulated in such a manner as to give him the benefit of the introduction without implicating him in the general practice. But it was urged in reply by the Surgeons of the Hospital, that "*qui facit per alium, facit per se,*" and that few, if any, Surgeons would submit to the privations consequent upon a strict adherence to their own department, if they could, without losing caste, purchase a share in the business of a Practitioner in Pharmacy, or a General Practitioner producing an immediate income. It was therefore considered that such an arrangement was an infraction of the regulation of the Hospital, and that surgical appointments should be reserved for those who adhere strictly to their own department, sacrificing the more rapid advancement in practice which the business of an Apothecary procures, electing in preference the higher rank and position belonging to the department of pure surgery.

We think there was hardship in Mr. Norman's case, as he was not aware that by the arrangement alluded to, he had rendered himself ineligible. On the contrary, he had exercised some ingenuity to evade the rigour of the law, and had distinguished himself as a Surgeon by voluntarily passing the examination for the fellowship in April, 1846. His testimonials also are very creditable. Mr. Norman, however, did no service to his cause by alluding to the case of Mr. Hetley, with a view of calling in question the justice and impartiality of the Committee. The distinction between the two cases is this : Mr. Hetley holds the appointment of House-Surgeon to the St. Marylebone Infirmary, and this does not, *ex officio*, include the practice of either Pharmacy or Midwifery, other officers being appointed for these duties ; but he occasionally assists the midwife in the absence of the Physician-Accoucheur, not in virtue of the office for which he receives his salary, but gratuitously, in the capacity of a medical student. His qualification in reference to Pharmacy was unimpeached.

Mr. Norman, we think injudiciously, inserted an advertisement in the papers, after the decision of Dec. 23d, to the effect that he had been rejected as a candidate on account of an obsolete law rarely acted on and about to be repealed. This proceeding was considered by the Committee to be in bad taste, and it did not add to the number of his advocates.

Mr. Norman's pamphlet having been referred by the Weekly Board

to the Medical Committee, the following is the Report (Aug. 10th, 1848):—

"The Medical Committee having taken into consideration the subject of Mr. Norman's pamphlet, with reference to clause 139, page 38, of the laws,

"*Resolved*, That this Committee is of opinion that the law should not be altered, more especially under the circumstances reported in their minutes of 23d December, 1847."—*Old Laws, page* 35, *clause* 21.

We have detailed the particulars of this case because it bears upon a subject which we have frequently had occasion to discuss, namely, the separation of Pharmacy from medical and surgical practice. Whether midwifery ought or ought not to be included in the prohibition is a question for the College of Surgeons to consider. It is true, that surgical instruments are frequently used in midwifery practice, and it may be asked, who ought to be the most qualified person to use surgical instruments, the Surgeon or the Apothecary? Does the habit of performing one kind of operation disqualify a person from performing another?—or is midwifery so degrading an avocation that a surgeon cannot practice it, even when surgical aid is required, without sacrificing his rank and position as a surgeon?

So far as Pharmacy is concerned, there can be no reasonable doubt about the propriety of making the distinction as complete as possible between the consulting or operating surgeon and the vendor of medicines; and a medical school may be considered the fountain-head which should maintain the principles on which such distinctions are founded.

Cases may occur in which it may be expedient and proper to deviate from a general rule, and the governors of the Middlesex Hospital could, if they thought proper, enact a special law in favour of an individual whom it might be desirable to elect notwithstanding some trifling deviation from the strict letter of the law on his part.

Outlines of Botany; *being a Text Book for the use of his Students.* By William Mateer, M. D., Belfast. Part I., small 8vo, pp. 40, with Plates. London: H. Balliere, 219, Regent Street.

Scriptural Authority for the Mitigation of the Pains of Labour by Chloroform and other Anæsthetic Agents. By Protheroe Smith, M.D. With an Appendix by Dr. Simpson. 8vo, pp. 52. London: S. Highly, Fleet Street.

The object of this pamphlet is to combat the opinion which some persons have expressed, that the pains of labour are the necessary consequence of the decree, "In sorrow thou shalt bring forth," and that consequently any mitigation of these pains is unjustifiable on Christian principles!! Much as we are surprised at the promulgation of this extraordinary doctrine by any member of the profession, we are still more surprized that it should be thought worth while to write a pamphlet of 52 pages in its refutation. Dr. Simpson exposes the fallacy in three lines, observing that the advocates of unmitigated pains "(according to their own doctrines) in practising physic, are really and truly practising a profession of sin and iniquity, in so far as man in the primeval curse was doomed to die, and yet they daily and hourly persist in attempting to make him live."

On the successful Treatment of Asiatic Cholera. By Edward Joseph, M.R.C.S., Pp. 8. London: Davy and Son, 8, Gilbert Street, Oxford Street.

OBITUARY.

DEATH OF BERZELIUS.

This distinguished chemist, the father of analytical chemistry, expired on the 7th inst., at Stockholm. Baron Berzelius was born on the 20th of August, 1779, in Ostergöthland, in Sweden, of a respectable family. At the age of seventeen he entered the University of Upsala, where he made a rapid progress in his studies, particularly his favourite science—Chemistry; after passing the necessary examinations, he received his diploma of Doctor in Medicine in 1804, and was appointed Medicinæ et Pharmaciæ Adjunctus at the Collegium Medicum at Stockholm, and gave instruction in chemistry to young students, and on account of his small income, was obliged to practise occasionally as a physician. In 1807 he was appointed Medicinæ et Pharmaciæ Professor; and in the same year he instituted, in conjunction with seven other eminent men, the Swedish Medical Society at Stockholm, now a most flourishing institution, and constituting the very heart of the medical profession in Sweden.

In 1808 he was made a member of the Royal Academy of Sciences, in 1810 officiated as President, and in 1818 as Perpetual Secretary. On the occasion of holding this appointment for a quarter of a century, a dinner was given in the Academy by the members to this distinguished *savant*, which was presided over by his present Majesty, then the Crown Prince, who on proposing the health of Berzelius, expressed his grateful acknowledgment of his own obligations to Berzelius for the valuable private instruction he had received from him in his younger days. In the same year he was appointed a member of the Royal Sanitary Board, of which, at the time of his death, he was the senior member. As a proof of the magnitude of his laborious pursuits, it may be sufficient to mention that he first developed the electro-chemical system, and that he has also examined and minutely described the atomic theory of the elementary bodies. He discovered and examined several great classes of chemical combinations, as, for instance, the different degrees in which sulphur combines with fluoric acid, with platinum, columbium, vanadium, tellurium, and phosphurus, the sulphates, &c. In organic chemistry he has no less distinguished himself by his experiments, and, properly speaking, he has laid the foundation of vegetable and animal chemistry, more particularly the latter. As regards chemical analysis, the highest merits are due to him, for having arranged a new and generally adopted chemical nomenclature. His works, which have been for the most part translated into the English, French, German, Italian, Spanish, and Polish languages, are so numerous and voluminous, that, considering the accuracy with which everything is described, it appears to be almost a wonder how one man, whose time, besides, is occupied by a great amount of official duties, has been able to accomplish such a mass of scientific publications.

Berzelius had received from his Majesty King Charles John many marks of high distinction: he was created a nobleman in 1818, a Baron in 1835, Knight Commander of the Royal Order of Wasa in 1821, and Grand Cross of the same order in 1829; he was a Knight of the Royal Swedish order of the Polar Star, and of several foreign orders received from the Emperor of Russia and the Kings of Prussia, Denmark, Belgium, France, and Sardinia; a honorary member of upwards of one hundred literary and scientific societies. In consideration of the great services which Berzelius has bestowed on his native country, the members of the Diet at Stockholm in 1840, voted to him the annual sum of 2000 dollars banco as a pension for his lifetime, independent of his former emoluments.—*Lancet.*

M. PYPERS,

EDITOR OF THE *Journal de Pharmacie d'Anvers.*

THE Pharmaceutieal Society of Antwerp is in a great measure indebted for its establishment to the exertions of M. Pypers, who continued up to the time of his last illness to be one of its most aetive supporters. The *Journal de Pharmacie d'Anvers*, of July, contains a warm eulogium of M. Pypers, whose decease is felt to be a serious ealamity to the Soeiety, in whieh he took so active a part. As a Pharmaeeutieal Chemist, he enjoyed a high standing at Antwerp, and was the author of several papers on chemieal subjeets. But his chief exertions in his public capaeity were devoted to the advaneement of Pharmacy by the introduction of improved education, and the improvement of the laws relating to his profession. The suecess attending these exertions, and his aptitude in promoting harmony and good-fellowship among his brethren, obtained for him general respect and esteem.

TO CORRESPONDENTS.

E. P. Corder.—Silver may be gilded by brushing it over with an amalgam of gold, and then heating it until the mercury is volatilized; or the gold may be deposited by electricity from a solution of oxide of gold in solution of cyanide of potassium. The solution may be prepared as follows:—Dissolve two ounces of cyanide of potassium in one pint of distilled water, then add a quarter of an ounce of oxide of gold, and heat the mixture until solution is effected.

G. B., Bedford.—There is no formula in the Pharmacopœia of Guy's Hospital, for *Liquor ferri sesquiacetatis*. It is probable that the *Ferri acetas* of the Dublin Pharmacopœia is meant. The following is the formula: Sesquioxide of iron one part, acetic acid six parts, digest for three days with agitation and strain. The dose is from ten drops to thirty.

M. P. S., Birmingham, complains of the practice of some Chemists in spelling the word *aërated* with *æ*, thus, *ærated*. He gives a quotation from Gray's *Operative Chemist*, where it is said, "*ærated kali* would etymologically signify kali impregnated with *æs* brass; whereas the name of the salt is from *aer* air, as being surcharged with what was called fixed air."

H. B., Farnham.—(1). When the ointment of iodide of potassium, made with lard, undergoes a change of colour, indicating the liberation of iodine, it is probable that the effect arises from the lard being rancid. In such case an organic acid would be present, which would decompose the iodide of potassium.—(2). The change of colour in the ointment of nitric oxide of mercury, arises from the reduction of the mercury, the oxygen passing to the fats.—(3). When a mixture of prussiate of potash and chlorate of potash is ignited, deflagration takes place, the potassium, iron, &c., being oxidized at the expense of the oxygen of the chloric acid.

A. P. S, Camden Town.—Mr. Redwood has not pursued the inquiry into the cause of the gelatinization of Tincture of Kino, since the publication of his paper on that subject, nor has the subject been investigated by any one else that we are aware of.

W., Chester.—Barm or yeast is no doubt less soluble in alcohol than in water, but the composition of yeast is not uniform, and therefore its properties may vary.

R. S.—*Eau de Javélle* is the name applied in France to solution of chloride of potash, that is, bleaching liquor, in which potash is substituted for lime. It may be thus prepared :—

℞ Dry chloride of lime (chlorinated lime) ℥ij.
Carbonate of potash, ℥iv.
Water, Oij.

Mix the chloride of lime with Oiss of water, dissolve the carbonate of potash in the remainder of the water, mix the two liquors, and filter the mixture.

Retort, Hastings.—One hundred parts of pure cane-sugar are capable of yielding nearly fifty-four parts of absolute alcohol. If raw sugar be used, the product would depend on the proportion of pure sugar contained in it, which is not constant. The best temperature at which to conduct the fermentation, is from 70° to 80° Fahr.

S. M., Bath, requests the publication of formulæ for blue, green, and red fires, for pyrotechnical purposes.

BLUE.

℞	Nitre	5 parts.	
	Sulphur	2 "	
	Metallic antimony	1 "	Mix.

GREEN.

℞	Nitrate of baryta	62½ parts.	
	Sulphur	10½ "	
	Chlorate of potash	23¾ "	
	Charcoal		
	Sulphuret of arsenic ãã	1¾ "	Mix.

RED.

℞	Dried nitrate of strontia	72 parts.	
	Sulphur	20 "	
	Gunpowder	6 "	
	Coal dust	2 "	Mix.

H. E. S., Chatham, will find on looking over the formula again, that it is correct as it stands. The formula of the Pharmacopœia yields twenty-seven ounces of product. The proposed formula yields the same amount of product with double the quantity of all the ingredients excepting the water.

Iodinum.—We are not acquainted with a tincture of iodide of iron. Most likely the preparation alluded to by our correspondent is the syrup. See vol. i., pages 47 and 520.

Magnesiæ Ferro Sulphas.—In answer to Omega (of last month) Mr. Peche, the maker of this salt, has removed to 1, Charrington Street, Oakley Square.

A Constant Reader (Wakefield), has sent some minute fragments of a small pill for analysis, desiring the prescription for preparing the same.—[We regret the impossibility of giving the required information. The analysis of a pill is a difficult problem, and can only be approximative, even if an appreciable quantity be furnished.]

M. P. S.—The process of percolation or displacement is described in vol. i., pages 61, 591, and 654.

Omega.—The nature of the examinations of the Pharmaceutical Society is described in Vol. vii., No. 7. The subscription from Associates is 10*s.* 6*d.* per annum.

G. B.—(1). Tinctura Pyrethri : Pyrethrum-root, one part; water, one part, rectified spirit of wine, five parts; macerate as usual.—(2). The Examinations, see Vol. vii, No. 7.

Poison for Beetles.—We have tried the phosphorus paste in several houses where the beetles were innumerable. In a few days they had almost entirely vanished. The quantity of poison consumed could not have destroyed a hundredth part of the number, except on the supposition that they eat one another; but it would appear that those who were not poisoned, took the alarm, and fled. When administered to beetles in a trap, they devour it greedily and soon die. This poison should be recommended to all bakers, as the congregation of beetles around the oven is an intolerable nuisance, the smell of which on passing the house is sickening to those who have an antipathy to this kind of vermin. The mode of preparing the phosphorus, is described in vol. vii., page 594.

Tyro Chemicus.—Acidulated Lemon Kali, see vol. iii, p. 116.—Ginger Beer Powders: ℞ Ess. lemon gutt. ij; Soda sesquicarb. ℈ij; Pulv. Zingib. gr. iv; Sacchari ʒij; misce. To be taken with acid tartaric, gr. xxxv.—Lemonade Powders: Ess. lemon gtt. ij; Soda sesquicarb. ʒss; Sacchari ʒj; misce. Acid citric vel tartaric ℈ij.

J. H. H., Odiham.—The rectified or purified oil of turpentine is often called spirit of turpentine.

H. L. London, L. B. York, and *Q. L. Greenwich,* see Vol. vii., No. 7.

Mr. Woolley will observe on referring to the article in question, that our observation applied merely to the substance of the Parliamentary Report on Disinfectants, in which we stated that "chloride of lime appeared to be almost forgotten." We had no intention of disparaging the preparation, but on the contrary implied that it is too well known to require puffing in the lobby of the House of Commons.

"*Amator Scientiæ*" (*Portsmouth*).—(1.) It may be used diluted with water. —(2.) The dose of the concentrated essence of ginger is from twenty to forty drops, or even more, if a strong stimulant be required.—(3.) A work *On Domestic Medicine, with first-rate Recipes, &c.*, would be of no value unless published with the name and authority of a medical practitioner.

A Medical Dispenser.—The following advertisement appeared in the *Times* of July 29th: "Wanted a young lad as an apprentice, from 13 to 15, well educated in the capacity of page to a medical gentleman of considerable practice, where he will ultimately have an opportunity of learning the drug business and dispensing medicine. He will be treated as a member of the family. A member of the Church of England will be preferred.—Apply to Mr. Pasmore, Chemist and Druggist, 5, Colville Terrace, King's Road, Chelsea. Premium only sixty guineas."

An Impostor.—A young man, calling himself Thomas Harris, a dispenser of medicines, has been soliciting charity of Chemists, stating that he was apprenticed at Doncaster, and lived lately with a medical man in Westminster. On inquiry of his referees, we ascertained that the party at Doncaster had never had an apprentice of that name. It was true that he had been in the situation at Westminster, having answered an advertisement and taken his place behind the counter, but absconded on the following day.

Pine Apple Preserve.—Cut pine-apples in thin slices, removing the rind, place them in a pan with an equal weight of sugar. In about twelve hours turn on the steam, and boil gently until the requisite consistence is obtained. A common extract-pan, with steam jacket, is the best apparatus for this as well as other preserves, in the preparation of which the laboratory may contribute usefully to the kitchen department.

Messrs. Mander, Weaver, and Co., will perceive that we have inserted the article.

The Infant Orphan Asylum.—The case of Edward Bridge, aged four years and six months, claims the support of those Members of our body who are Subscribers to the Infant Orphan Asylum. His father was one of the original Members of the Pharmaceutical Society, but having continued his membership four or five years, he withdrew from it, under the impression that the Society was of no use, and joined the College of Chemistry. Shortly afterwards, he had a fall from a chaise, which paralyzed his brain, and reduced him to a state of helplessness, from which there is no hope of his recovery. If he had not sacrificed his claim by leaving the Society, his family would have experienced the advantage, as they would have been entitled to relief from the Benevolent Fund. There are three boys under the age of ten years, besides the one above-named, on whose behalf proxies are received by Mr. Hudson, 27, Haymarket, and several other Chemists.

Religious Tests in Medical Elections.—Our attention has been directed to the recent election of a Professor at Edinburgh, in which one of the candidates, Dr. Barry, was precluded from a chance of success from the fact of his being a Dissenter, and therefore unable to subscribe to the tests prescribed by the University. The subject is likely to be further considered, and in all probability the restriction will be removed. It appears to be the opinion of some persons that the tests are not absolutely imperative, although nominally in force. Dr. Barry, however, who had, in other respects, every prospect of success, withdrew from the contest on account of the prevailing opinion among his friends that their votes would be void if given to a dissenter.

Sunday Trading.—We are requested by Mr. Beaton, of 174, Shoreditch, to publish the following *Notice*, which is in process of signature:

"NOTICE.

"We, the undersigned, Surgeons, Chemists, and Druggists, anxious to relieve ourselves and Assistants from incessant toil do agree and undertake to abridge the hours of general business on the Sabbath-day.

"With a due regard to the public necessities, we propose being in attendance till Eleven o'clock in the forenoon, and after Six in the evening. In the intermediate hours to supply nothing but what may be urgently required in case of sudden indisposition, or under professional direction.

"We enter into this arrangement, first, because we from experience are convinced that it will relieve us from supplying many unnecessary articles on the Sabbath; next, because we feel we are entitled to enjoy this brief repose from active duty on that day which is consecrated to rest for all mankind.

"To carry out this object, we agree to commence on Sunday, September the 3d, and between the hours of eleven and six, to keep our doors locked and all the shutters up."

The number of signatures amounts already to eighty-nine.

Advertisements to Mr. CHURCHILL, Princes Street, Soho.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. SMITH, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the EDITOR, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. IV.—OCTOBER 1st, 1848.

THE PHARMACEUTICAL MEETINGS.

With a view of extending the interest of our members in the Pharmaceutical Meetings, and promoting the object for which they were established, the Council came to a resolution during the past year to give notice of the subjects to be discussed at each meeting whenever this should be found practicable.

After the usual interval of relaxation, the session is about to commence, and we have much pleasure in referring our readers to the Notice on the Cover of this number, in which the subjects likely to come forward on Wednesday, the 11th, are stated.

The spontaneous decomposition to which chloroform is said to be liable when exposed to light and air will become a subject of discussion. As this is a matter of great importance, we are anxious to obtain evidence on this point from manufacturers and members of the profession who are in the habit of using chloroform. Those who may have had experience in the subject will confer a benefit on the profession and the public by stating the result of their observations.

THE MEDICINE STAMP ACT.

Subjoined is a copy of the Instructions to Officers relating to Medicine Duty, recently issued by the Commissioners of Stamps. In order to make the information complete, we have appended the schedule referred to in the instructions, which places in one view the substance of the law relating to the subject, and will thus enable our readers to understand more clearly the conditions under which stamps are required. We may observe that there is in these instructions nothing at variance with what we have already published (vol. vii. p. 361 and 452), but the form in which the information is conveyed is more concise and explicit, and being published under authority, may be referred to with greater confidence.

Those who may have forgotten to take out their Licence *for the present year will perceive the importance of doing so immediately, as the penalty of £20 is recoverable on every sale of a medicine liable to stamp duty until such licence is taken out.*

INSTRUCTIONS TO OFFICERS RELATING TO MEDICINE DUTY.

OFFICE OF STAMPS AND TAXES, *Somerset House, London*, 1848.

DUTIES ON MEDICINES.

By the 44 Geo. III., c. 98, Stamp Duties are charged on certain medicines, and also on Licences to be taken out yearly for selling the same.

The Duties on Medicines are as follows, viz.—

	£	s.	d.
For every Packet, Box, Bottle, Pot, or other Enclosure, with its contents, not exceeding the price or value of One Shilling	0	0	1½
Do. do. do. Two Shillings and Sixpence	0	0	3
Do. do. do. Four Shillings	0	0	6
Do. do. do. Ten Shillings	0	1	0
Do. do. do. Twenty Shillings	0	2	0
Do. do. do. Thirty Shillings	0	3	0
Do. do. do. Fifty Shillings	0	10	0
Do. do., exceeding ditto	1	0	0

These duties are denoted by stamped labels required to be affixed to the articles charged, which (besides those specified by name in the schedule to the 52 Geo. III., c. 150) are, All preparations for the prevention, cure, or relief of any disorder or complaint incident to, or in anywise affecting the human body, of the following descriptions, viz.—

1st.—Those wherein the maker or vendor claims to have any occult secret or art, or exclusive right for making the same.

2d.—Those which are or shall at any time have been sold under letters patent; and,

3d. Those which are or shall have been by public notice or advertisement, or by paper or handbill, or by any label or words written or printed, affixed to or delivered with the packet, &c., held out or recommended as nostrums, or proprietary medicines, or as specifics, or *as beneficial to the prevention, cure, or relief of any distemper, malady, ailment, disorder, or complaint incident to, or in anywise affecting the human body.*

Note.—The artificial mineral and other waters specified in the schedule to the 50 Geo. III., c. 150, and all compositions for making the same, are exempted by the 3 & 4 Will. IV., c. 97, s. 20.

A penalty of £10 is incurred by selling any article of medicine, liable to duty, without a duly stamped label; and it is required that the label shall be affixed in such manner that the packet, &c., cannot be opened, and the contents poured out or taken therefrom, without destroying such stamp; the Penalty being incurred if the medicine be sold with the stamp affixed in any other manner.—52 Geo. III., c. 150, s. 2.

A penalty of £20 is imposed for fraudulently removing a stamp from any article of medicine after it has been sold; or for using again, or selling or buying again, any such stamp.—42 Geo. III., c. 56, ss. 13 and 14.

Any person receiving for sale any such medicines not duly stamped, and neglecting within ten days to return the same, or to give information thereof to the Commissioners, and deposit the articles with the nearest distributor of stamps, incurs a penalty of £20.—43 Geo. III., c. 73, s. 2.

DUTY ON LICENCES TO SELL MEDICINES.

Every person vending medicines liable to duty, is required to take out an annual licence chargeable with duty as hereafter mentioned, viz.—

	£	s.	d.
If within the cities of London or Westminster, or within the limits of the twopenny post, or in the city of Edinburgh	2	0	0
In any other city or borough or town corporate	0	10	0
In any other part of Great Britain	0	5	0

All such licences expire on the 31st August, and ought to be immediately renewed ; but by the regulation of the Board, parties are allowed the whole of the month of September for obtaining fresh licences ; therefore during the latter month the Board's officers are to refrain from making detections against such persons for selling medicines without licence.

A penalty of £20 is incurred by any persons selling medicines *liable to duty*, without a licence.—42 Geo. III., c. 56, ss. 6 and 8.

In making detections with the view to prosecutions for evading the medicine or licence duty, the attention of the officers is chiefly directed to such articles as are sold in connection with any public notice or advertisement, handbill, or label, describing the quality or efficacy of the medicine within the Act of Parliament, rather than to those which are merely designated by labels affixed to them, such as "Antibilious Pills," "Cough Mixture," &c.

There are some articles strictly chargeable with duty, but which partake more of the character of perfumery than of medicine, and are sold chiefly by hairdressers and perfumers ; cases of this kind should be submitted to the Board's solicitor for his directions before they are interfered with by the officer.

In order to detect any person selling patent medicines without a licence, or without a stamped label thereto affixed, or with a label impressed with too low a rate of duty, an article must be purchased at the shop or house at which the business is carried on ; and any wrapper or other covering to the packet is not to be disturbed further than is requisite to ascertain whether there be a proper stamped label attached, and the packet as well as any paper or covering removed must be marked, so that the purchaser may be able to identify them at a future period ; and to prove when, where, and of whom the article was purchased, and the price paid for it. The box or packet containing the medicine is not in any case to be opened.

If a person be employed by an officer to purchase an article, he should bring it precisely in the same state in which it was purchased, to the officer, in order that the wrapper may be removed, if requisite, and the necessary memorandum made thereon in the presence of the officer.

The article purchased (together with the wrapper and any printed papers delivered therewith) is to be inclosed in an envelope, and inscribed with the name of the person of whom purchased, the date and the name of the officer, and is to be transmitted to the solicitor, and a report of the case is to be forwarded at the same time, fairly written on a sheet of foolscap paper, according to one of the forms annexed.

No. 1.

MEDICINE LICENCE DUTY.

[*Place of Officer's Residence*]

[*Date.*]

GENTLEMEN,—I beg to report that on the day of instant [*or last*] I* purchased of [*party's name*] Chemist, at his shop, situate [*No. &c. Place of residence to be accurately stated, the parish also if known*] one box of [*Cockle's Antibilious Pills*] for which I paid [1*s.* 1½*d.*] The proper stamp duty label is affixed to the medicine, but the said is not licensed to deal in stamped medicines.

I have the honour to be, Gentlemen,

Your very obedient Servant,

[*Officer's Name.*]

To the Hon. The Commissioners of Stamps and Taxes.

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* If the officer employed a person to make the detection, say A. B., of, &c. [*name, residence, and occupation of person employed*] employed by me for the purpose, purchased of, &c.

No. 2.

MEDICINE DUTY.

[*Place of Officer's Residence.*]
[*Date.*]

GENTLEMEN,—I beg to report that on the day of instant [*or last*] I* purchased of [*party's name in full*] Chemist, at his shop, situate [*No. &c., parish, and place of residence*] one bottle of [*description of the article*] for which I paid [*price*]. The article is liable to the medicine stamp duty, but was sold without any stamp being thereto affixed.

I have the honour to be, Gentlemen,
Your very obedient Servant,
[*Officer's name*].

To the Hon. the Commissioners of Stamps and Taxes.

No. 3.

MEDICINE LICENCE DUTY AND MEDICINE DUTY.

N.B.—It frequently occurs that an article liable to the medicine duty is sold by an unlicensed person, in such cases, both the penalty of £20 and £10 of course attach to the single act of sale.

The report of this double offence may be easily framed from the preceding forms.

THE SCHEDULE TO WHICH THIS ACT REFERS:

Adam's Solvent
Addison's Re-animating European Balsam
Æthereal Anodyne Spirit
Ague and Fever Drops (by Wilson)
Allan's Nipple Liniment
Amboyna Lotion
——— Mouth Powder
——— Tooth Powder
American Alterative Pills
——— Salve
——— Soothing Syrup
——— Tincture
Andalusia Water
Anderson's Scots Pills
Angibaud's Lozenges of Blois
Anodyne Necklace
Antapoplectic Pills
Appleby's Tea
Arabian Balsam
Arnold's Drops
——— Pills
Arquebusade Water
Aromatick Spirit of Vinegar
——— Condensed
Asiatic Bilious Pills
——— Tonic Tincture
Austin's Chalybeate Pills
——— Liniment
Balm of Mecca
—— of Quito
Balsam of Iceland Liverwort
Barclay's Antibilious Pills
——— Asthmatic Candy
——— Ointment
Barlowe's Specific Medicine
Barron's Cachou de Rose Lozenges
Barton's Alterative Pomade
——— Vital Wine
Bateman's Drops
——— Golden Spirit of Scurvy
——— Grass
——— Plain Spirits of ditto
Bath's Pills
Bayley's British Tooth Powder
——— Ointment
——— Pectoral Pills
Beaseley's Family Plaister
Beaumé de Vie
Beiker's Tincture
Bell's Restorative Pills
Bennet's Worm Powders
Benzoin, Essence of
Berry's Bilious Pills

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* If the officer employed a person to make the detection, say A. B. of, &c. [*name, residence, and occupation of person employed*] employed by me for the purpose, purchased of, &c.

Betton's British Oil
Bird's Ague Tincture
Birt's Martial Balsam
Blair's Cephalic Fluid
Blenkensop's Bilious Pills
Boerhaave's Antiscorbutic Wine
Bolderson's Worm Cakes
Bollman's Specific
Bolton's Asthmatic Tincture
Bostock's Cordial
——— Grand Elixir
Bott's Corn Salve
——— Tooth Powder
Bourne's Æthereal Essence
Box's Magnesia Lozenges
Brabham's Oil
Brandon's Composition or Medicine for the Evil and Scrophula
Brazil Salts
Brodum's Botanic Pills
——— Botanical Syrup
——— Nervous Cordial
Browne's British Pills
——— Rheumatic Powders
——— Tincture of Yellow Bark
Bryant's Essence of Coltsfoot
Burridge's Specific for Rheumatic Gout and Rheumatism
Byron's Pills
Bythell's Pectoral Lozenges
Camphor, Æthereal Essence of
Catharmian Water
Cathcart's Edinburgh Ointment
——— Water
Cephalic Snuff
Chamberlain's Ointment
——— Pills
Chapman's Cerate
——— Chilblain Water
Ching's Worm Lozenges
Chinner's Pills
Church's Anodyne Essence
——— Antispasmodic Elixir
——— Chilblain Ointment
——— Cough Drops
——— Eye Salve
——— Pectoral Pills
——— Volatile Tincture
Clerval's Syrup
Clinton's Oil for Deafness
——— Snuff
Clyde's Balsam
——— Ointment
Coates' Cough Drops
Collier's Assistant Pills
——— Ointment
——— Remedy for Fistula and Piles
Complin's Specific
Cooke's Rheumatic Pills
——— Family Pills
Cordial Balm of Gilead
Cornwell's Fruit Lozenges
——— Opodeldoc
——— Oriental Vegetable Cordial
Costello's Cerate
——— Collyrium
——— Liniment
Cottier's Resolvent and Healing Plaister
Cox's Tincture
Coxwell's Castor Oil Medicine
Culpepper's Herb Cordial
Cundell's Balsam of Honey
Curtis's Syrup
Daffy's Elixir, by whomsoever made
Dalby's Carminative
Dalmahoy's Sal Poignant
——— Tasteless Salts
Dawson's Lozenges
Deering's Drops
Delescot's Myrtle Opiate
De Velnos' Pills
——— Syrup
Dicey and Co.'s Bathing Spirits
Dickenson's Cephalic Drops
——— Red Drops for Convulsions
——— Drops for Fits
Dixon's Antibilious Pills
Donavan's American Vegetable Syrup
Doranstorf's Opodeldoc
Dutch Drops
Earl's Remedy for the Hooping Cough
Eau de Cologne
Eau Medicinale de Husson
Edge's Chronic Embrocation
———Universal Cerate
Edward's Ague Tincture
——— Nipple Ointment
Elixir of Longevity, or Swedish Preservative
Ellis's Aperient Pills
Essence Kayou Pouti
Falck's Cerate
——— Universal Pills
Felton's Mucilage of Marsh Mallows
Findon's Drops
Fisher's Golden Snuff
Flexney's Wart Dissolvent
Fogoni's Tincture
Ford's Balsam of Horehound
Foredyce's Cooling Opening Pills

Foreign Medicines of all kinds, except Drugs
Fothergill's Pectoral Pills
——————— Restorative
Fraunce's Elixir
Freake's Tincture of Bark
Freeman's Bathing Spirits
——————— Eye Water
——————— Gutta Salutaris
Friar's Balsam
Friend to Man
Frith's Antibilious Elixir
Fry's Worm Pills
Gall's Antibilious Pills
Gamble's Aromatic Snuff
——————— Sanative Tea
Garaveni's Styptic
Gardener's Ointment
——————— Pills
German Corn Plaister or Salve
Gifford's Pills
Gilbert's Roseate Lotion
Glasse's Magnesia
Godbold's Balsam
Godfrey's Cordial
——————— Rose Lozenges
Gordon's Pills
Gould's Powders and Lotion
Gowland's Lotion
Grand Specific or Infallible Antidote to Consumptions
Grant's Drops
——————— Lisbon Tonic Pills
Green's Honey Lozenges
——————— Oil, or Infallible Oil
——————— Toothache Pills
Greenhough's Tincture
——————————— Tolu Lozenges
Grey's Lozenges
——————— Tooth Powder
Griffin's Asthmatic Tincture
Grubb's Fryars' Drops
Guest's Lotion
——————— Pills
——————— Powder
——————— Tooth Powder
——————— Welcome Guest
Haarlam's Drops
Hadley's Convulsion Powders
Hallam's Anima of Quassia
——————— Antibilious Pills
——————— Quassia ditto
Hamilton's Asthmatic Effluvia
——————————— Cinnamon Drops
——————————— Corn Salve
——————————— Patent Mineral Water
Hamilton's Vegetable Balsamic Tincture
Hannay's Wash
Harrison's Pile Lozenges
Harvey's Anti-Venereal Pills
——————— Grand Restorative Drops
Hatfield's Tincture
Hayman's Maredant's Drops
Hayward's Stomachic Lozenges
——————————— Anti-Acid ditto
——————————— Samaritan Water
Hemet's Essence of Pearl
——————— Pearl Dentrifice
Heming's Pine Bud Lozenges
Henry's Aromatic Spirits of Vinegar
——————— Magnesia
Hewitt's Analambanic Pills
Hickman's Pills
Hill's Balsam of Honey
——————— Bardana Drops
——————— Canada Balsam
——————— Essence of Water Dock
——————— Gout Essence
——————— Tincture of Centaury
——————————— Sage
——————— Valerian
Hinde's Powders
——————— Drops
Hodson's Aromatic Nervine Tea
——————————— Imperial Oil
——————————— Persian Restorative
——————————— Syrup
Holdsworth's Lozenges
Hollingshead's Balsam
Hooper's Female Pills
Hooping Cough Drops
Hope's Hectic Pills
Howell's Powders for Epilepsy
Hudson's Tablets for the Worms
Hungary Balsam for the Stone and Gravel
Hunt's Family Pills
Hunter's Elixir
——————————— Pills
——————————— Restorative
Jackson's Asthmatic Candy
——————————— Corn Salve
——————————— Ointment
——————————— Tincture
Jacobson's Cough Drops
James's Analeptic Pills
——————— Antibilious Pills
——————— Fever Powder
——————— Medicine for the Dropsy
——————— Tin Powder for the Worms
Jebb's, Sir Richard, Elixir

Jebb's, Sir Richard, Pills
Jenkins's Salve
Jesuits' Drops
Imperial Anodyne Opodeldoc
Infallible Restorative
Inglis's Scot's Pills
Irvine's Fruit Lozenges
Johnson's Golden Ointment for the Eyes
Johnston's Essence of Horehound
Johntenocco's Tooth Powder
Jones's Rheumatic Tincture
Juniper's Essence of Penny Royal
——————— Peppermint
Kemps's Gangrene Ointment
Kennedy's Corn Salve or Plaister
Keyser's Pills
Knight's Pills
Lamert's Balsam
Lancaster Black Drop
Leake's Cerate
——— Chilblain Water
——— Pills
——— Purifying Drops
Leathe's Lotion
Le Cour's Imperial Oil
Lee's Lozenges
Lewis's Salve
——— Specific Pills
——— Tincture of Angustura Bark
Liquid Shell for the Stone and Gravel
Lobb's Stomachic Tincture
Lockyer's Pills
Lord's Corn Salve or Plaister
Lorraine's Consumptive Pills
Lowrie's Eye Water
Lowther's Drops
——— Nervous Powders
Lozenges Aniseed
——— Benzoin
——— Camomile
——— Ginger
——— Horehound
——— Ipecacuanha
——— Patirosa
——— Peppermint
——— Poppy
——— Rose
——— Roseated Liquorice
——— Specific
——— Spermaceti
——— Tolu
Lucas's Pure Drops of Life
Luzatte's British Pills
Lygnum's Antiscorbutic Drops
——— Lotion
——— Pills
Lynch's Embrocation
Madden's Vegetable Essence
Magnesia Tablets
Manne's Cough Medicine
Mapson's Sanative Salve
Marshall's Cerate
——— Wart Dissolvent
——— Heal-All
Mason's Ointment
Matthew's or Matthews's Alterative Medicine
——— Chymical Tincture
——— Remedy for curing Fistula and Piles without Cutting or Pain
——— Samaritan Restorative
Mayersbach's Balsamic Pills
——— Mixture
——— Restorative Powders
Medley's Aromatic Herb Snuff
Metallic Tractors
Military Drops
Millman's Itch Ointment
Mollineaux's Ointment
Monsey's Rheumatic Powders
Nailor's Corn Ointment
Newton's Restorative Tooth Powder
Norman's Syrup
Norris's Chalybeate Pills
——— Drops
——— Tonic Essence
Norton's Marodant's Drops
Odontalgic Elixir for Toothache
Oliver's Remedy for Consumption
Oliverian Ointment for the Piles
Orme's Medicine
Ormskirk Medicine for the Bite of a Mad Dog
Oxley's Essence of Jamaica Ginger
——— Stomachic Tincture
Palmer's Laxative Pills
Paraguay Lotion
Paris Ointment
Paschall's Teething Remedy
Pectoral Essence of Coltsfoot
Perkins' Metallic Tractors
Perrin's Antibilious or Cough Pills
——— Balsam of Lungwort
——— Pile Ointment
——— Powder for the Hooping Cough
Perry's Essence
Peter's Pills
——— Tincture
Pidding's Balsam of Liquorice
Pike's Ointment
Pomade Divine
——— Royal

Potter's Pills
Powell's Camphor Liniment
——— Eye Salve
Price's Breast Salve
Prickett's Styptic
Prince's Russia Oil
Pullen's Antiscorbutic Pills
——— Purging Pills
Purland's Expectorating Pills
Pyrmont Tablets
Radcliffe's Purging Elixir
——— Rheumatic Tincture
Randall's Essence of Ginger
Refined British Oil
Relfe's Nipple Ointment
Richardson's British Corn Salve or Plaister
Riga Balsam
Robberd's Cough Drops
Robert's Worm Sugar Plums
Robertson's Vegetable Julep
Roche's Embrocation
Roe's English Coffee for Nervous Disorders
Rogers' Antibilious Elixir
——— Antiscorbutic Pills
Rook's Balsam
Rose Tablets
Ruspini's Styptic
——— Tincture
——— Tincture for the Toothache
——— Tooth Powder
Ryan's Essence of Colt'sfoot
Rymer's Cardiac and Nervous Tincture
——— Detergent Pills
——— Essence of Garlick
——— Pectoral Medicine
——— Tonic Pills
Salmon's Guttæ Vitæ
Savage's Oil
Saville's Ointment
Schnid's Liquid Dentrifice
Schult's Vegetable Acid Air
Scot's Gout Pills
Senate's Aromatic Steel Lozenges, or Lozenges of Steel
Severne's Worm Tea
——— Ague Cakes
Sharpe's Hepatic Pills
Sharp's Drops for Cancers
Shaw's Sovereign Itch Ointment
Shee's Specific Drops
———Pills
———Preventive Lotion
Sibley's Lunar Tincture
——— Solar ditto
Simson's Infallible Æthereal Tincture
Singleton's Golden Ointment
Sloane's, Sir Hans, Pills
Smart's Tincture of Cascarilla Bark
Smellome's Eye Salve
Smith's Antibilious Pills
——— Antihectic Balsam
——— Cooling Opening Pills
——— Drops
——— Purifying Pills
——— Restorative Medicated Wine
Smyth's Drops
——— Restorative
Solander's Sanative Tea
Soley's Essence of Squills
Solomon's Abstergent
——— Anti-Impetigines
——— Balm of Gilead
Spain's Restorative Oil
Speediman's Stomach Pills
Specific Convulsion Drops
——— for the Yellow Fever
——— Remedy (by Wessels).
——— Tincture
Spence's Dentrifice
Spilsbury's Antiscorbutic Drops
——— Compound Essence
Spinluff's Aromatic Bilious Cordial
Squire's Elixir
Squirrel's Drops
——— Tonic Pills
——— Powders
Steer's Camomile Drops
——— Camphorated Eye Water
——— Convulsion Oil
——— Nitre Drops
——— Opodeldoc
——— Paregoric Lozenges
——— Purging Elixir
——— Solution of Myrrh
Sterne's Balsamic Æther
——— Stomachic Tablets
——— Tincture of Gout Drops
Storey's Worm Cakes
Stoughton's Bitters
——— Elixir
Stringer's Essence of Myrrh
——— Myrrh Dentrifice
——— Paregoric Lozenges
Swedish Preservative, or Elixir of Longevity
Swinfen's Anti-Acid
——— Electuary
——— Ointment
——— Worm Sugar Cakes
Swiss Balsam

Syrian Corn Plaister
Tasteless Ague Drops
——— Fever Drops
Taylor's Antispasmodic Pills
———Remedy for Deafness
———Restorative Balsam for the Eyes
Thomas's Tolu Essence
Thompson's Ague Tincture
——— —— Patent Medicinal Water
Tickell's Æther
Tincture for the Teeth and Gums
Tooley's Cordial
Toothache Fluid
Tooth Powder, Asiatic
———————Paraguay
Tooth Powder Royal
Trotter's Asiatic Tooth Powder
Trowbridge's Golden Pills
Tuberosa Vitæ, or Chilblain Water
Turlington's Balsam
Vandour's Nervous Pills
Van Swieten's Gout Cordial
Vegetable Embrocation
Vital Balm
Waite's Worm Nuts
Walford's Pancreatic Powders
Walker's Jesuits' Drops
——— Specific Remedy
——— Stomachic Wine
Walkey's Tooth Powder
Waller's Ointment
Walsh's Antipertussis
———Coltsfoot Lozenges
———Ginger Seeds
———Pills
Ward's Dropsy Pills
——— Essence for the Headache
——— Liquid Sweat
——— Paste
Ward's Powders
——— Red Pills
——— Sack Drops
——— Sweating Powder
——— White Drops
Ware's Asthmatic Drops
Warren's Analeptic Powders
———British Tooth Powder
Waters, *videlicet* —— All artificial Mineral Waters, and all Waters impregnated with Soda or Mineral Alkali, or with Carbonic Acid Gas, and all Compositions in a liquid or solid state, to be used for the purpose of compounding or making any of the said Waters
Webster's Diet Drink
Welch's Female Pills
Wheatley's Ointment
———Fluid
Whitehead's Cerate
——— Essence of Mustard
——— ——— of Horehound
——— Pills
Whittell's Black Drops
Williams's Aperient Pills
——— Essence of Benzoin or Pulmonic Drops
——— Spa Elixir, or Restorative Drops
Willis's Asthmatic Pills
Wilson's Balsam
———Opening Pills
———Powders
Winch's Cough Drops
Withers's Essence of Camomile
Wray's Ague Pills
York Medicinal Preventive Lotion
Zimmerman's Stimulating Fluid

And also all other Pills, Powders, Lozenges, Tinctures, Potions, Cordials, Electuaries, Plaisters, Unguents, Salves, Ointments, Drops, Lotions, Oils, Spirits, Medicated Herbs and Waters, chemical and officinal Preparations whatsoever, to be used or applied externally or internally as Medicines or Medicaments for the Prevention, Cure, or Relief of any Disorder or Complaint incident to or in anywise affecting the human body, made, prepared, uttered, vended, or exposed to sale by any Person or Persons whatsoever, wherein the Person making, preparing, uttering, vending, or exposing to sale the same, hath or claims to have any occult Secret or Art for the making or preparing the same, or hath or claims to have any exclusive Right or Title to the making or preparing the same, or which have at any Time heretofore been, now are, or shall hereafter be prepared, uttered, vended, or exposed to sale under the Authority of any Letters Patent under the Great Seal, or which have at any time heretofore been, now are, or shall hereafter be by any public Notice or Advertisement, or by any written or printed Papers or Handbills, or by any Label or Words written or printed, affixed to or delivered with any Packet, Box, Bottle, Phial, or

other inclosure containing the same, held out or recommended to the Public by the Makers, Vendors, or Proprietors thereof as Nostrums or Proprietary Medicines, or as Specifics, or as beneficial to the Prevention, Cure, or Relief of any Distemper, Malady, Ailment, Disorder, or Complaint incident to, or in anywise affecting the human body.

PREVENTION OF GAS EXPLOSIONS.

The judicial investigation into the cause of the late gas explosion in Albany Street—an explosion which has been declared by a competent authority to be perhaps the most disastrous which has taken place since gaslights have been used—has shown that the public is lamentably ignorant of the nature, physical qualities, and explosive properties of gas and gaseous mixtures. Mr. Alfred Taylor and Dr. Arnott—the former in the *Medical Gazette*, the latter in the *Times* newspaper—have each endeavoured to supply, in a popular form, that kind of useful and valuable information, of which it is obvious the public mind stands so much in need.

In our last number we gave a short account (taken from the *Times* newspaper) of the accident in Albany Street, as well as Mr. Taylor's paper on the cause and prevention of gas explosions; and we propose now to make a few extracts from Dr. Arnott's article on this subject, and to subjoin some observations of our own.

After a popular notice of the mechanical properties of aëriform fluids, and the explosive force of mixed gases, Dr. Arnott notices the extraordinary series of faults committed to bring about the Albany Street explosion. As a knowledge of them is useful, as a warning in other cases, we subjoin his summary of them :—

"1. The gas meter with its pipes and cock—a delicate apparatus, likely to be damaged by a rough touch—was placed in an enclosed dark space under the window shelf, which was made to serve also as the receptacle for the numerous heavy window shutters pushed in and dragged out every morning and evening.

"2. It was not a careful person of the shop who managed the window shutters, but a thoughtless boy, who came night and morning for that purpose alone.

"4. It had been often observed that gas was escaping, and examinations and repairs about the meter were frequent, yet the hazardous arrangement remained unchanged.

"4. When at last, on the night of the catastrophe, the boy, as was to be expected, struck the meter forcibly with a shutter, and thereby instantly extinguished all the light in the shop, no natural alarm was felt by the persons in the shop; but his account that the shutter had accidentally touched the main cock, and so turned off the gas, was admitted as complete. The small cocks at the three burners were then shut, and he was allowed to depart. He had in reality left a leak at the meter, apparently by breaking the main cock and pipe, which in one hour and twenty minutes filled with explosive mixture the shop, where shortly before the three lamps had been burning in safety.

"5. Smell of gas was felt almost immediately near the shop door, and before long at the top of the stairs; and when Mr. Loten and the shopwoman were called down to supper in the back parlour, which communicated by a door with the shop, the smell was so strong that Mr. Loten, taking a candle in his hand, went towards the shop to examine it. He had opened the door just enough to let the air of the shop touch the candle, when the explosion occurred. He and his companion were blown with part of the wall of the house into the back yard, both much burned, but not killed. A maidservant who was in the passage near the front door, was dashed across the street, and killed on the railings there.

"6. The shop with so many lights in it had no fire-place to favour ventilation, and the doors had been edged with leather to make them close. Then the complete mixture of escaping gas with the air of the shop was brought about by the fact that the gas did not escape from the burners high up, but entered the shop low down, and through the chinks of the shutter box."

To these we may add his suggestions for the safety of gas consumers.

"From what has now been said, it will appear that the means of safety for persons using gas in their houses are—

"1. To have the apparatus made and fixed by competent workmen.

"2. If any leak be perceived by the smell, to have it promptly attended to, and to open doors or windows to prevent accumulation.

"3. On no account to carry a lighted candle to where there is strong smell of gas.

"4. To have the room or rooms in which gas is burnt ventilated from near the ceiling. The balanced chimney valve, which I proposed some years ago as a means of maintaining a healthy state of inhabited rooms generally, and which, having been mentioned in a clause added to the Metropolitan Building Act expressly to direct the mode of fixing it, is already extensively used, would, I believe, make it almost impossible for a dangerous accumulation to take place, even if the burner cocks were purposely left open; and wherever gas is used in an inhabited place, this valve is not more important as a security against explosion than it is to guard inmates against the deleterious effect of breathing the burnt air of common gas illumination or of any other. There is no patent right for the valve and an adroit workman anywhere may make it.

"With these precautions, gas is, in a majority of cases, not only the most beautiful, convenient, and cheap means of lighting, but, as shown by past experience, rendered still more assuring by the explanations of scientific men, is also on the whole the safest; and gas may therefore be regarded as one of the precious boons which advancing science has bestowed of late on the human kind."

It must be obvious from these extracts that the odorous quality of coal gas constitutes one of its most valuable properties. In it resides the general safety of gas illumination; for if gas were without smell the first indications of an escape or leakage would be an explosion. We have of late heard frequent dissertations on the purity of gas; and by some persons the introduction, into our houses, of an inodorous, or as they term it, pure gas, has been regarded as a great desideratum. But this is a popular error; for if an inodorous gas, fitted for the purposes of illumination, could be obtained, its employment in our dwellings would be attended

with very considerable risk, and ought perhaps to be prohibited. This, however, is practically impossible, for however desirable it may be, and undoubtedly is, to deprive coal gas of the sulphur, sulphuretted hydrogen, and other superfluous impurities which it usually contains, it will always retain enough odour to denote its presence when mixed in any considerable quantity with atmospheric air. Without professing to be admirers of the smell of gas tar, we cannot help regarding with some favour the gas odour, for if gas had an agreeable, instead of a disagreeable odour, many leakages would be allowed to exist, on account of the trouble and expense attending their rectification.

Many persons suppose that a slight smell of gas is unimportant; and that the existence of an explosive mixture must always be manifested by a *strong* smell. Here is another popular error. Even Dr. Arnott seems to think that the danger of explosion exists only when there is "a strong smell of gas," for his caution with respect to carrying a lighted candle into a room applies to this case only. Moreover, it might be inferred from his suggestions that if the doors or windows are open dangerous accumulations of gas will be prevented. Such, however, is not necessarily the case, as the recent explosion at the Lake Tavern, Starch Green, Shepherd's Bush, shows. The cock of a gas-burner, suspended from the ceiling of a small apartment, had been left turned on. The upper part of the room thus became filled with an explosive mixture; but owing to the lower half of the window being open, the middle and lower part of the room was kept comparatively free from gas; and in consequence a slight smell only, or at least not a strong smell, of gas was perceived. The landlord, assisted by his wife, was in the act of lighting the gas, when a most violent explosion took place: the window of the room was shattered, the paint scorched, and the landlord and his wife both seriously burnt; the flame of the burning gaseous mixture passed through the doorway into the next apartment, and there set fire to the muslin curtains, whilst the concussion caused the destruction of the glass of the window of this room also.

The shape of the handles of stop-cocks is important. Sometimes they are made round like a button, hexagonal, or in the form of a rosette. This may be ornamental, but it is extremely inconvenient, as there is no means of ascertaining whether the gas is on or off, except by applying the nose or a light to the burner. We have seen this exemplified in a lecture-room, where the burners have buttons instead of flat taps: sometimes the gas is observed to be too high, and one of the audience who is near rises to adjust it; he first turns it higher, then turns it out, and the lecturer is interrupted, while his assistant, by a series of experiments discovers the right position of the button. This form of tap is liable

to accident even in the act of wiping off the dust, during which ordinary operation it may be turned unconsciously by the servant.

The ventilation recommended by Dr. Arnott is valuable, not only for assisting to prevent the accumulation of explosive mixtures, but also for carrying off the products of combustion. If coal gas were a pure carbo-hydrogen, the only products of its complete combustion would be carbonic acid and water : that is, the carbon and hydrogen composing the gas would each be oxidized at the expense of atmospheric oxygen ; the one yielding carbonic acid and the other aqueous vapour. The air would become deteriorated partly by the loss of oxygen, but chiefly by the gain of carbonic acid,—a positive poison. In proportion to the light produced there is reason to believe that the combustion of coal gas causes a greater deterioration of the air than that of oil. In his examination by the Committee of the Athenæum Club, Mr. Faraday stated that " as to the proportionate deterioration of air by the oyxgen abstracted, I think it probable that gas would, *light for light*, have the greatest effect." Now, although, perhaps, strong and healthy persons would not be sensible of the greater loss of oxygen by the use of coal gas, yet the greater heat produced as a consequence of the greater consumption of oxygen, renders the atmosphere more oppressive and injurious to health. Thus the heat produced by the combustion of oil and of gas, is *light for light*, as 2 is to 3 : and it is probable that the abstraction of oxygen and consequent deterioration of the air by these two combustibles, are in the same ratio.

Ordinary coal gas is always contaminated with sulphur, which probably exists in the gas in at least two forms, as bisulphuret of carbon and as sulphuretted hydrogen. By the combustion of this element sulphurous acid is produced, which is, perhaps, in part at least converted into sulphuric acid. Although the quantity of sulphurous acid in an apartment lighted by gas, is at any one time, very small, yet the constant exposure of living beings and goods to its influence, in ill-ventilated apartments, is productive of injury to both health and property. The exposure night after night to a deteriorated and heated atmosphere, loaded with carbonic acid and contaminated with sulphurous acid cannot but prove highly detrimental to all persons, but especially to those whose health is delicate and who are disposed to phthisical and other pulmonary complaints. The presence of sulphurous and sulphuric acids in such apartments is manifested by the usual chemical effects of these agents. It is well known that the colours of cotton fabrics kept in the upper part of linen-drapers' shops, lighted with gas, are more or less destroyed by long exposure to the atmosphere of such a place. The injury sustained by the bindings of books has been before stated in this journal by Mr. Brayley, one of the librarians of

the London Institution (See *Pharmaceutical Journal*, vol. vi., p. 584). This gentleman tells us that the bindings of the books in the libraries of the London Institution, of the Athenæum Club, and of the Earl of Tyrconnel, have been in this way destroyed. The expense entailed on the proprietors of these libraries for the renewal of the bookbindings has been very considerable; and in order to get rid of these obnoxious products of combustion, the Athenæum Club has substituted Faraday's gas lamps, while the managers of the London Institution have replaced the old open burners by the brilliant Bude light.

ORIGINAL AND EXTRACTED ARTICLES.

ACTION OF NITRO-SULPHURIC ACID ON SUGAR.

BY MR. LEWIS THOMPSON.

When sugar is acted on by a mixture of nitric and sulphuric acids, a peculiar substance is produced, having a close resemblance to common resin, not only in its appearance and physical characters, but also in regard to its solubility in alcohol, ether, volatile oils, &c., and insolubility in water. This substance is, however, extremely inflammable and explosive, and possesses many of the properties ascribed to the celebrated Greek fire. Its affinity for alcohol and ether is so great, that water will not remove these fluids from it. Not having yet succeeded in producing with it any definite basic compound, which would enable me to controul my results, I have not attempted its analysis. The only purposes to which I have applied it are, to the formation of fusees for shells, and to the preservation of gunpowder and pyrotechnical articles from damp and moisture. As a fusee, it is easily lighted, burns with great regularity, and appears absolutely incapable of being extinguished, circumstances which would render it of great use in "ricochet" practice. As a means of preventing the mischievous effect of damp and moisture on gunpowder, it is of great value. The best mode of application is to plunge the gunpowder for a few seconds into an alcoholic or ethereal solution of the sugar compound, and then withdraw it, and allow it to dry at a gentle heat, say 120° Fahr., though there is no danger of an explosion at 212°. In this way the gunpowder is covered by a coat of varnish, easy of ignition, and insoluble in water, which cannot therefore penetrate to the gunpowder, the explosive nature of which is rather augmented than diminished by this treatment. An ethereal solution of gun-cotton does not answer so well for this purpose, nor is it so manageable. I have not ascertained how far this new substance is useful in retaining the edges of wounds in approximation, but its alcoholic solution merits a trial. The following is the

method which I have found most successful in the manufacture of this compound :—

Mix together sixteen parts of concentrated sulphuric acid, and eight parts of nitric acid, specific gravity 1.50, place the mixture in cold water, and when the temperature has fallen to 60° or less, stir in one part of finely-powdered sugar, which will become pasty in a few seconds, and is then to be removed and plunged in cold water; more sugar may then be added to the acid mixture, and removed as before. The compound is then to be washed in water and dissolved in alcohol, to which a solution of carbonate of potash must now be added in excess, so as to precipitate the substance in question, and neutralize its uncombined acid. After careful washing with water, it is again to be dissolved in alcohol or ether, and cautiously evaporated to dryness by a steam heat, which must be continued for some time, so as entirely to expel the alcohol or ether. The residuary matter should have the transparency and general characters of common resin.

Byker Bar, Newcastle-on-Tyne,
Sept. 19th, 1848.

MISTURA PYROTARTARICA, A PROPOSED REMEDY FOR CHOLERA.

The apprehended advent of Asiatic Cholera to this country, has induced the publication in the newspapers of several proposed remedies for the malady. Among others, a German prescription has appeared in the *Times*, which refers to a preparation, *Mistura pyrotartarica*, not generally known in this country. We are, therefore, induced to give the formula for this compound, for the information of those of our readers who may happen to be applied to for it. The prescription alluded to was contained in a communication from Dr. Kruger Hansen, of Gustrow in Saxony. It is as follows :—

"The two remedies which I have hitherto found so efficacious, are the following :—

No. 1.

℞ Misturæ Pyrotartaricæ, ℥ij.
Tinct. Opii Simpl., ℥ss.
N.B. About twenty drops for a grown person.

No. 2.

℞ Cort. Cascarillæ, gr. xij.
Pulv. Aromat., gr. iv.
Alum. Crud., gr. ij.
Opii Crud., g. j.
N.B. Det. pro dosi, the quantity deemed requisite.

On referring to the foreign Pharmacopœias, we find Mistura Pyrotartarica ordered in the *Pharmacopœia Saxonica* and the *Pharmacopœia Slesvico-Holsatica*. We believe the former is that which has authority at Gustrow. As there is a slight difference in the formulæ, we give them both.

MISTURA PYROTARTARICA.

Pharm. Saxonica, 1830.	*Pharm. Slesvico-Holsat.*, 1831.
℞ Sp. Angelic. Comp., ℥vj.	℞ Sp. Angelic. Comp., ℥xij.
Liq. Pyrotartaric. rectif., ℥iv.	Liq. Pyrotartaric, ℥viij.
Acid. Sulphur., ℥ss.	Acid. Sulphur. concent., ℥ss.
Mix.	Mix.
	Clear, brownish, sp. gr., 0.98.

The following are the formulæ for the two first-named ingredients :

SPIRITUS ANGELICÆ COMPOSITUS.

Pharm. Saxon., 1830, and *Pharm. Slesvico-Holsat*, 1831.

℞ Angelica root, ℔j.
Herb of Water Germander (*Teucrium scordium*), ℔ss.
Juniper berries
Valerian root, āā ℥iij
Rectified spirit, ℔vj.
Water, q. s. Mix, and distil ℔vj, and add to the distillate
Camphor, ℥iss.

Clear, but becomes turbid when mixed with water.

LIQUOR PYROTARTARICUS.

Pharmacopœia Slesvico-Holsat, 1831.

Half fill an iron or earthen retort with cream of tartar, and submit it to distillation at an augmenting temperature, attaching a large receiver and safety tube. The distilled liquor is separated from the empyreumatic oil by filtration, and kept for use. The residue in the retort is made into carbonate of potash.

Note.—Clear, reddish-brown, having a sourish and empyreumatic taste and smell; scarcely heavier than water; when evaporated, it yields crystals, which are easily sublimed.

LIQUOR PYROTARTARICUS RECTIFICATUS.

Pharm. Saxon., 1830.

The above liquor redistilled.

A FEW STATISTICS OF CHOLERA AT PLYMOUTH.

BY W. HAMILTON, M.B.

The population of the two parishes of St. Andrew and Charles, which compose the borough of Plymouth, according to the official enumeration in 1831, was 31,080, and in 1841, 36,527, showing an increase during the interval of ten years of 5,447, averaging for each year 544.7, or in round numbers, 545, giving for the probable amount of population at the period of the invasion of cholera, 31,625. Of this population, 1,870 individuals, or one out of every 21.29, or somewhat more than 21¼, were attacked during the three months of June, July, and August; and of these 771, or one out of every 41 of the entire population died, and the deaths were to the cases as one to 2.425471, or nearly 2½. But, as from a variety of causes a considerable number of cases and deaths from cholera were not reported to the Board, it is perhaps impossible to state with certainty the precise number of victims chargeable to cholera—a comparative view of the number of burials which took place during each of these three months in 1831 and 1832, will perhaps enable us to form a more correct estimate of the influence of cholera in augmenting mortality.

From returns obtained from the various places of interment, we learn

that the burials which took place in each of these two years, were as follows :—

Places of Interment.	JUNE.		JULY.		AUGUST.	
	1831.	1832.	1831.	1832.	1831.	1832.
St. Andrews.	16	31	23	177	40	336
Charles.....	17	27	32	70	23	189
Wesleyan	6	4	10	12	8	32
Presbyterian	1	4	1	8	—	15
Baptist	—	1	—	1	—	4
Friends	—	1	1	—	—	2
Total.....	40	68	67	268	71	578

From an examination of this table we cannot fail to be struck with the remarkable contrast which the year of cholera presents in comparison with its predecessor. The excess of mortality in the former exceeding that in the latter by 28 or 7 per cent. in June, by 201 or 300 per cent. in July, and by 507 or 714 per cent. in August. The annexed table exhibits the monthly, weekly, and daily number of burials in each of those months during the two years under consideration :—

	JUNE.		JULY.		AUGUST.	
	1831.	1832.	1831.	1832.	1831.	1832.
Per Month	40.	68.	67.	268.	71.	578.
Per Week	9.3373	15.86732	15.12903	60.61613	16.0323	130.51613
Per Day ...	1.3339	2.26676	2.16129	8.64516	2.29	18.64516

Thus we have for the comparative burials during these three months, of 914 in 1832, against 178 in 1831. The burials in 1831 amounting to little more than half per cent. of the existing population, while in 1832 they reached to 2.95, or within a minute fraction of three per cent.

Octagon, August 23, 1848.

PREPARATION OF COLLODION, OR SOLUTION OF GUN-COTTON,

As an Adhesive Material for Surgical Purposes.

M. Malgaigne has recently communicated to the French Medical Journals some remarks on the preparation of gun-cotton for surgical purposes. Several French Chemists, at the suggestion of M. Malgaigne, attempted to make an ethereal solution of this compound by pursuing the process recommended by Mr. Maynard in the *American Journal of Medical Sciences* ; but they failed in procuring the cotton in a state in which it could be dissolved by ether. It appears that these experimentalists had employed a mixture of nitric and sulphuric acids ; but M. Mialhe ascertained, after many trials, that the collodion, in a state fitted for solution,

was much more easily procured by using a mixture of nitrate of potash and sulphuric acid.

For the information of our readers who may be disposed to try this new adhesive material, we here give a description of M. Mialhe's process for its preparation. It appears, from the results obtained by this Chemist, that cotton, in its most explosive form, is not the best fitted for making the ethereal solution :—

	Parts by weight.
Finely powdered nitrate of potash.....	40
Concentrated sulphuric acid*	60
Carded cotton	2

Mix the nitre with the sulphuric acid in a porcelain vessel, then add the cotton, and agitate the mass for three minutes by the aid of two glass rods. Wash the cotton, without first pressing it, in a large quantity of water, and when all acidity is removed (indicated by litmus paper), press it firmly in a cloth. Pull it out into a loose mass, and dry it in a stove at a moderate heat.

The compound thus obtained is not pure fulminating cotton ; it always retains a small quantity of sulphuric acid, is less inflammable than gun-cotton, and it leaves a carbonaceous residue after explosion. It has, however, in a remarkable degree, the property of solubility in ether, especially when mixed with a little alcohol, and it forms therewith a very adhesive solution, to which the name of *Collodion* has been applied.

Preparation of Collodion.

Prepared cotton	8	parts by weight.
Rectified Sulphuric ether 125		"
Rectified Alcohol.....	8	"

Put the cotton with the ether into a well-stopped bottle, and shake the mixture for some minutes. Then add the alcohol by degrees, and continue to shake until the whole of the liquid acquires a syrupy consistency. It may be then passed through a cloth, the residue strongly pressed, and the liquid kept in a well-secured bottle.

Collodion thus prepared possesses remarkably adhesive properties. A piece of linen or cotton cloth covered with it, and made to adhere by evaporation to the palm of the hand, will support, after a few minutes, without giving way, a weight of from twenty to thirty pounds. Its adhesive power is so great, that the cloth will commonly be torn before it gives way. The collodion cannot be regarded as a perfect solution of the cotton. It contains, suspended and floating in it, a quantity of the vegetable fibre which has escaped the solvent action of the ether. The liquid portion may be separated from these fibres by a filter, but it is doubtful whether this is an advantage. In the evaporation of the liquid, these undissolved fibres, by felting with each other, appear to give a greater degree of tenacity and resistance to the dried mass.

In the preparation of collodion it is indispensable to avoid the presence of *water*, as this renders it less adhesive ; hence the ether as well as the alcohol, should be pure and rectified. The parts to which the collodion is applied should be first thoroughly *dried*, and no water allowed to come in contact with them until all the ether is evaporated.—*London Medical Gazette.*

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* The common commercial acid will answer. When very weak, a longer immersion of the cotton is required.

ON THE CULTIVATION OF SAFFRON IN FRANCE AND AUSTRIA.

1. Saffron was not cultivated in France before the Crusades. The bulbs (*cormi*) from Avignon were introduced towards the latter end of the fourteenth century, by a gentleman of the family of Porchaires, who first planted them on his estate at Boyner. The botanical characters of the *Crocus sativus autumnalis* are well known. The same bulb or cormus flowers once only ; and as soon as the flower is withered, a bud (*caïeu*) appears, which, after having produced several flowers in the autumn of the second year, also dies. After the third year the bulbs should be transplanted.

A dark, somewhat loose, sandy soil, in a sunny situation, suits it best. Heavy, wet, claycy, and freshly-manured soils are unfavourable for its cultivation. The usual manure is the marc of the grape. The bulbs are planted at the beginning of July, about twelve to a square foot. A temperature of 14° Fahr. is very injurious to them, in case the snow does not lie very high. In the Gatanais, the saffron herb dries up in May, but it is collected for feeding cows.

The saffron bulbs are subject to two diseases : one called the *tracon*, is a kind of dry rot (*carie sèche*), the other termed the *death* (*la mort*), is chiefly humidity of the glandular bodies. Some agriculturists have cured the *tracon* by placing the bulbs for some days in well-dried marc of grapes. The death (*la mort*) is incurable and infectious. Two different kinds of insects are found on the bulbs affected by this malady.

When the flowers are gathered, the stigmata (*le jaune*) are plucked off, dried and preserved in dry wooden boxes, for when well protected from dampness, the saffron keeps for years.

Saffron is adulterated by mixing it with safflower, marigolds reddened by salt, and shreds of beef (*la rouelle de bœuf*).

Saffron is employed in dyeing, in cookery, in pharmacy, and in medicine.

In France and Spain, a balsam or saffron ointment is prepared from it, under the name of *Croco-magma* or *Crocinum*. It is also used as a prophylactic against sea-sickness.

2. The saffron of Lower Austria is the best and most costly in Europe, but the produce is scarcely sufficient for the home consumption, and therefore, saffron is imported. It is chiefly produced at Ravelsbach, Meissau, Eggendorf, Kirchbeg, and Wagram. Most of the saffron gardens have a substratum of loam, covered about a foot high with mould. Wheat fields are best adapted for the cultivation of saffron, the produce being three-fold that of the wheat. The gardens should be placed dry, exposed to the sun, and towards the south, and protected against northerly winds. They should not be shaded by forest trees, nor be too much elevated and exposed to the wind. Districts favourable for the cultivation of the vine suit best.

The flowering season begins during the last week of September, and ends in the first week of October ; but it sometimes lasts till the beginning of November.

The soil is prepared after three methods : the first is similar to that of preparing a garden-bed.

By the second method, the field is ploughed in autumn after the harvest, the same as for wheat, only somewhat deeper and narrower.

According to the third method, the field is ploughed immediately after the harvest (whether of wheat, rye, or oats), and then rolled and harrowed. Three days before planting, the field is trimmed. The manure is only added during planting ; but so that it is well covered with earth and does not come in contact with the bulbs. This method requires the best soil and the smallest and best manure, as sheep manure.

The saffron bulb is called in Austria *Kiel*. It is of the size of a walnut, surrounded by ten or twelve soft, bass-like membranes, of a cinnamon-brown colour, which terminate at the top, around the germ, in capillary threads—called *Bollen*—but in such a manner that only about three of them reach the top, the others being shorter and finer. The multiplication of the saffron proceeds from these bulbs (*Kiele*). No case is known of a flower producing seed. Each bulb produces within half a year, namely, between autumn and the end of spring, from one or two, or from three to four new young bulbs ; but the parent bulb perishes in the meanwhile every year, and nothing remains of it but some coarse blackish brown membranes, called *Bollen*, and a dried hard mass—the *Plattel*, on which the young bulbs are seated. Before the bulbs are planted they must be cleared of all membranes remaining of the parent bulb, of the plattel, &c. and all damaged or diseased bulbs rejected. They are stowed away three to four inches high, in a dry airy place.

The sowing is performed by two men, one making with a hoe furrows of eight inches depth, the other placing the bulbs three inches apart, and pressing them in the ground so that they are half covered.

The saffron flowers appear before the leaves and can easily be removed, without disturbing the bulb. The best time for gathering them is early in the morning while they are closed. When gathered they are spread in a cool room, on cloth or straw mats, until fit for picking. The picking (called *Saffronlösen*) consists in separating the trifid stigma from the style, and removing it from the flower. This is done the day after the gathering and must be performed without separating the parts of the tripid stigma (called the *Zunglein*, or little tongue) from one another. They should remain adherent, or as it is said, "the *Bock* should be entire." Little or nothing of the yellow style should be left attached to the stigma. In this way the saffron has a better appearance and fetches a higher price. On the following day it is dried on a hair-sieve over a charcoal fire ; and placed in boxes without compression. After a few hours it becomes oily and flexible, and can then be pressed into well-closed boxes.

Most of the Austrian saffron is sold at Krems on the 28th of October. Its price is from 30 to 32 fl.[=36—38 fl. 24 kr. Rhenish] per pound.

After the crop of the first year, the green leaves are left growing till the spring of the next year, and in June, when they begin to wither and to become yellow at the top, they are mowed as food for cattle. The little bulb (*Knöllchen*) which in the first year had formed itself on the parent bulb, and from which a little tube, with or without flower, had already grown, in the autumn of the second year, goes on swelling till the spring. About Whitsuntide, the new bulb (*Kiel*), called *Kindel*, is perfect. If every thing goes on well, the saffron-garden will, in the autumn of the second year, contain two or three times the quantity of bulbs (each bearing two or three flowers) originally planted. If the bulbs are left for a third crop, nothing else is to be done but what was required after the first, namely, mowing the grass and carefully removing the weeds in July. It is, however, remarkable, that neither bulbs nor flowers multiply in the third year.

The bulbs having now yielded saffron for two, three, or four years, are removed about Whitsuntide, when the new bulb (*Kiel*) is perfectly developed, the saffron-grass gathered, and the old bulb quite disappeared. By means of a coarse sieve they are cleaned of the adhering mould, and stored up in an airy barn or loft.

Three diseases are known to attack the bulbs. The first is the rot (*Faulniss*), which, though visible externally, destroys the substance of the bulb. The second disease is a turnip-like excrescence (*Rhizoctonia crocorum* Decand.) which appears mostly on the inferior part of the bulb, which it deprives of its nourishment. Both this, as well as the before-

mentioned disease, is not common. The latter can be removed by picking the bulbs.

The third is the most fatal malady. It is called the *death* (*Tod*). It consists in the formation of a malignant, woolly, truffle-like fungus, composed of several separate balls of the size of a hazel-nut. These are partly close to the bulb, partly one to three inches distant from it; but they never appear at the surface of the ground. From these balls, a large number of violet-coloured, fine, woolly fibres spread, partly from one ball to the other, partly surrounding the membrane of the bulb like a net. They penetrate between the membranes to the substance of the bulb, and then kill it. In Lower Austria, the disease is called the *Brand*, or *Austand*. One such diseased bulb is sufficient to infect a whole garden. The existence of the disease is known by bare circular spots in the saffron-garden; in the bulb itself black holes are perceived, as if dusted with soot; sometimes they look as if burnt. Duhamel advises the spread of the disease to be checked by digging one foot deep around each infected spot, and placing in heaps the earth of the infected spots.

ON SOME PHENOMENA OF CAPILLARY ATTRACTION,

Observed with Chloroform, Bisulphuret of Carbon, and other Liquids.

BY GEORGE WILSON, M.D.,
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The phenomena of capillary attraction which appear, when one solid and one liquid are brought together, have been extensively observed, and commented on by natural philosophers. Much less attention, however, appears to have been paid to what occurs when a single solid is in contact with two or more liquids of different densities, and which do not dissolve, or act chemically upon each other; although it cannot be doubted that an inquiry into this branch of the subject would bring to light novel facts, and might contribute greatly to the realization of a complete theory of capillary action.

I have happened recently, to notice quite accidentally, some striking phenomena, which show themselves, when certain liquids denser than water, are exposed, while contained in glass or glazed porcelain vessels, to the alternate action of aqueous solutions of acids and alkalies. The object of this communication, is to bring the phenomena observed before the Society, as a slender contribution towards the extension of our knowledge of capillary attraction. I shall describe them at length, as manifested with chloroform, the liquid with which I have made most experiments, and afterwards refer briefly to the results obtained with other fluids.

When chloroform is placed in a test-tube, or other vessel of glass, standing on a horizontal surface, it exhibits, like other substances which wet that solid, a curved surface with the concavity upwards. If water or an aqueous solution of nitric, sulphuric, or muriatic acid, be poured over the stratum of chloroform, the surface of the latter immediately changes the direction of its curve, and becomes convex upwards; the convexity induced being much greater, however, than the previous concavity. If, on the other hand, an aqueous solution of potash, soda or ammonia be placed above the chloroform, the latter ceases at its upper limit to present a sensible curvature upwards or downwards, and shows a surface, which to the unassisted eye, appears to be flat. It is to this property of an acid to round, and of an alkali to flatten, the surface of various liquids, of which chloroform is one, that I seek specially to direct attention.

The phenomena referred to, cannot seem remarkable when merely described; but they have appeared striking, and I may say, startling to

most who have witnessed them. They are best observed by dropping into a perfectly clean, flat-bottomed glass vessel containing pure water, a quantity of chloroform too small in amount to touch the walls of the vessel on every side. The heavier liquid then shows itself, as a brilliant, highly mobile globule. If alkali be now added, the globule in a moment collapses, sinks as if exposed to a crushing force, and flattens out on the bottom of the glass. On slightly supersaturating the alkali with an acid, the flattened chloroform starts into its previous globular shape with a momentum and rapidity such as might be exhibited by a highly elastic substance, like a ball of caoutchouc suddenly relieved from enormous pressure. When the acid in its turn is supersaturated with alkali, the flattening again occurs, and by alternating the addition of these reagents, the same globule may be successively flattened and rounded for any number of times.

It is necessary here to mention, that the employment of an acid is not essential to the development of the phenomena described. In distilled water, chloroform exhibits a convexity of upper surface as marked as in the aqueous solution of an acid. The alternate addition to water, and removal from it of alkali, are as efficacious accordingly as the successive addition of alkali and acid. But the washing away of the former by repeated affusions and decantations of water, is a tedious and unsatisfactory process, which has the great disadvantage of changing the form of the globule by slow gradations from a flat to a convex surface, whilst an acid effects the conversion *per saltum*. I shall confine my observations, accordingly, to the action of alkalies and acids, although the effect of the latter in altering the shape of the chloroform globule, is not greater, but as I incline to think, less than that of water.

Change in configuration, however, is not the only alteration which the globule of chloroform undergoes. Some of its other physical properties are markedly altered by its contact with acids and alkalies. These changes are best seen when a deep white saucer or flat-bottomed porcelain basin is made use of, as the containing vessel. When acidulated water is placed in this, and chloroform let fall into it, the denser fluid is scarcely wetted, and although nearly half as heavy again as pure water, sinks reluctantly*. If the drops indeed be small, they never reach the bottom, but floating on the surface evaporate away. Those which descend form globules very mobile, and readily obeying the solicitation of gravity. When separate globules meet, they rapidly flow together, and scarcely one is to be seen without a bubble of air attached to its upper surface, and adhering very tenaciously. I have already referred to the brilliancy of the drops of chloroform at the bottom of the water; they retain this character when the water is acidulated.

When the water on the other hand is alkaline, the chloroform is quickly wetted, and sinks swiftly. The drops, if small, become circular discs with rounded edges; if large, they are oval, or spread out into elongated, irregularly ovoidal, or flattened cylindrical forms. Their shape, however, is changed by the slightest impulse or inclination of the containing vessel, in a way which, perhaps, I may best illustrate by comparing it to the ever-varying elongations, contractions, and irregular swellings, which alter the configuration of an active living leech in a glass of water. The flattened globule, moreover, is much less mobile than the rounded one in acid. The former moves sluggishly, even down an inclination; clings to the vessel, and when compelled to move rapidly, leaves a tail behind it, like foul

* The sp. gr. of chloroform is generally stated to be 1.480, but the density of pure specimens averages at least 1.494, according to the observation of my friend Mr. W. Swan.

mercury. No air-bells attach themselves to it, and its brilliancy is sensibly diminished, as if its refractive index had altered.

The phenomena I have described are sufficiently striking when made with colourless chloroform, but I find that the addition of colouring matter to that liquid makes all of them much more conspicuous, and curiously modifies some of them. In reference to this subject, I premise, in case the fact has not already been put on record, that chloroform dissolves in whole, or in part, the colouring principles of turmeric and rhubarb root, of blue litmus, and of the false alkanet (*Anchusa tinctoria*). It probably dissolves many other organic colouring matters, but those are the only ones I have tried. It can thus be made yellow, blue, and red, and although its solvent action on the substances referred to, is much inferior to that of water, alcohol, and ether, chloroform becomes sufficiently deeply tinted to contrast strongly with colourless liquids. Its behaviour with these, is in consequence more readily observed, especially when capillary tubes are made use of. The litmus blue chloroform keeps its colour worse than the turmeric or alkanet solutions, but it is preferable to them, for its tint is wholly unaffected by acids or alkalies, unless very concentrated; whilst these change the colour of red and yellow chloroform, and what is still more annoying to the experimenter, become coloured themselves.

When alkali is added to water in a porcelain vessel, at the bottom of which a globule of blue chloroform is lying, the latter flattens out much more than when not coloured; frequently spreading over an irregular area, five or six times greater than it occupied before the alkali was poured upon it. It is impossible to speak of its form, as no two coloured globules shape themselves alike. I can compare their appearance only to that of a thin, diffused cloud, which a casual observer would not readily believe was a dense liquid, identical with the brilliant globules which roll about under water, or an acid. The apparent viscidity of these extended globules is great, and their sluggishness and immobility much more striking than when uncoloured. The colouring matter appears here and there in dark specks, as if it had been abandoned by the chloroform, yet as soon as a sufficiency of acid is added, the diffused chloroform-nebula rapidly contracts, gathers as it were all the colouring matter to itself, and springs up into an elastic-like globule, as deeply tinted, to appearance, as before the acid was added. In all probability, however, a little of the colouring matter is held only in suspension by the globule, for the water dissolves the chloroform without dissolving the litmus, and as the chloroform solution was originally saturated at its boiling point, it must, of necessity, part with some of the colouring matter.

Precisely similar phenomena are observed with the turmeric and alkanet solutions, only the chloroform and water alternately change their tint from yellow to brown, or from red to blue, as acid or alkali is added.

All the phenomena I have described, as observed with colourless chloroform, may likewise be seen with Dutch liquid ($C_4 H_4, Cl_2$), a substance containing the same elements as chloroform, although in a different proportion, and scarcely distinguishable from it in odour. Bisulphuret of carbon also comports itself with acids and alkalies, as the liquids already mentioned do. Dutch liquid, however, is troublesome to prepare and purify, and sulphuret of carbon has an odour which many deem very offensive. Chloroform is the most pleasant of the three liquids to work with, and what is sold in the shops is pure enough for the purpose.

The volatile oils, which are heavier than water, likewise comport themselves under acids and alkalies like chloroform. Those which I have tried are, the oils of sassafras, of cloves, of cinnamon, and of bitter almonds, in their crude state. These oils, however, do not illustrate the phenomena so well as the three liquids mentioned before. The drops which do not sink,

cannot evaporate away, so that they soil the sides of the glass, and the alkali appears permanently to modify the oil.

Bromine also flattens under alkalies, and rounds under acids when at the bottom of water; but the change is less perceptible than with the other liquids mentioned. The experiment indeed, cannot be fully tried, owing to the rapid action of alkaline solutions on bromine, and the impossibility of exposing the latter to these, without chemical combination occurring.

These are all the liquids I have observed which exhibit the phenomena described under the head of Chloroform. They are, however, the only ones I have tried, so that I do not doubt many others will be found behaving towards acids and alkalies in the manner I have described.

I may here mention also, that besides the alkalies, lime-water and baryta-water flatten chloroform, likewise aqueous solutions of the carbonates of potash and soda, but not so far as one trial can decide the commercial carbonate of ammonia. Solutions of neutral and acid salts, so far as I have tried them, appear all to round the surface of chloroform. The solvent action of that substance, however, greatly limits the trial of experiments. All the liquids lighter than chloroform, except aqueous solutions, which I have tried, have been dissolved by it. The volative oils, olive, castor, and cod-liver oil, ether, alcohol, bisulphuret of carbon and wood-spirit, appear miscible in all proportions with it.

In conclusion, I would refer for a moment to a question connected with the theory of the phenomena recorded. In speculating on the causes of the phenomena of capillary attraction, presented by a single liquid and a solid, there are at most but two *loci* of force to consider, the solid and the liquid. In seeking to explain the phenomena I have described, however, there are three possible *loci* of force, the two liquids and the solid, so that the problem becomes more complex.

I have looked anxiously for any appearance which might indicate whether alkalies *ex. gr.* in flattening chloroform, do so by direct action on that liquid, or on the solid constituting the containing vessel, or on both. I have not been able to find an *instantia crucis* as to this question; but without seeking to affirm that the alkali may not *immediately* modify the forces resident in the walls of the vessel, I think evidence can be adduced to show that the alkali does directly affect the mutual attraction of the particles of the chloroform and other liquids alluded to. I would refer, in proof of this, to three facts:—1. Chloroform rapidly wets and sinks in alkaline solutions. 2. When chloroform is shaken with these liquids, it breaks into more numerous and smaller globules than in water or acids. The same phenomenon is still more observable with sulphuret of carbon, and with oil of sassafras, and of cinnamon, whose densities approach more nearly to that of water than that of chloroform does, so that their globules can be longer retained in semi-suspension in water, away from the solid, than is the case with chloroform. 3. When from a narrow pipette, an alkaline solution is dropped on a large globule of chloroform, under water, in a wide vessel, the globule begins to flatten before the alkali can have reached the bottom so as to act on the solid.

A consideration of these facts has led me, from the first, to think it probable that the action of the chloroform and the alkaline water on each other, is more concerned in the production of the capillary phenomena described in the foregoing paper than the influence of either or both liquids on the containing vessel. I offer this as an opinion, for I cannot demonstrate its truth experimentally; but apart from other reasons for holding it, I have been led to connect the flattening of chloroform under alkalies with the chemical affinity of the latter for it, and its rounding under acids with the comparative indifference which even the strong acids

exhibit towards it. Chemical *affinity* may often justly be regarded as *attraction*, in the strictest sense of the term. The molecules of bodies, in many cases, come nearer each other when they combine chemically. This may be the case when chloroform and potash are converted by their mutual action into chloride of potassium and formic acid. The alkaline solutions made use of, in the experiments recorded, were in every case too weak to decompose chloroform ; but this does not forbid the idea of the liquids coming into closer physical contact than they otherwise would have come, in virtue of a chemical affinity, which nevertheless does not rise high enough to effect combination or decomposition. A weak electrical current will polarize water and effect a temporary change in the molecular arrangement of its elements, although it may be too feeble to decompose the liquid. A similar power, *mutatis mutandis*, may be ascribed to weak alkaline solutions in their effect on chloroform ; and the rounding effect of acids may be regarded as in great part negative, and so far limited to the removal of the alkali.

I refer to this attractive power of chemical affinity, only as a possible cause of the phenomena recorded, and as one cause at work where more forces than one are probably concerned in producing the effect.*—*Quarterly Journal of the Chemical Society.*

ON THE NATURE, CAUSE, AND PREVENTION OF SCURVY.

BY ALFRED B. GARROD, M.D.,
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From the different writers on scurvy it appears, that although impure air, cold, moisture, age, and condition of habit, may favour the occurrence of this disease, yet no one of them can be regarded as the real cause, which must be sought for in the nature of the food. This is fully proved in the writings of Lind, Trotter, Budd, Christison, Curran, Ritchie, &c. It appears also, that it is due to the *absence* of some essential ingredient in the food, and not from the *presence* of any noxious substance ; for the use of salt in large quantities is certainly not a cause, many of the most severe cases of disease having occurred where no such diet had been used, and sea water has never been found to aggravate the symptoms of the sufferers. The causes of the disease are thus reduced to one of the two following, viz. :—

1st. To the absence or deficiency of some *organic* substance in the food.

2d. To the absence or deficiency of some *inorganic* constituent.

Finding that all the theories of scurvy hitherto advanced were imperfect, I was led to examine more minutely the composition of food under the use of which scurvy was capable of occurring, and also of such substances as had been proved beyond doubt to be anti-scorbutic, and afterwards to seek for the absence or deficiency of certain normal substances in the blood ; and from such examinations I was led to the following conclusions :—

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* Mr. William Swan, who has been kind enough to make some observations, at my request, on certain of the physical properties of chloroform, which add to the facts I have put on record, has taken up the question in its purely physical or physico-mathematical relation, and formed a theory on the subject. The discussion is of too purely physical a character to have come within the sphere of the Chemical Society, otherwise Mr. Swan's paper would have accompanied or followed my communication. His essay will appear in the July number of the *London and Edinburgh Philosophical Magazine.* I direct the attention of those who are interested in the question discussed in the present communication, to that gentleman's paper, as containing many new facts and interesting speculations.

1st. That in all scorbutic diets, *potash* exists in much smaller quantities than in those which are capable of maintaining health.

2d. That all substances proved to act as anti-scorbutics contain a large amount of *potash*.

3d. That in scurvy the blood is deficient in *potash*, and the amount of that substance thrown out by the kidneys less than that which occurs in health.

4th. That scorbutic patients will recover when *potash* is added to their food, the other constituents remaining as before, both in quantity and quality, and without the use of succulent vegetables or milk.

5th. That the theory which ascribes the cause of scurvy to a deficiency of *potash* in the food, is also capable of rationally explaining many symptoms of that disease.

Before attempting to prove any of these propositions, I will give a table containing the amount of potash contained in several articles of diet. The potash was determined by forming the double salt with the bichloride of platinum ($KC + Pt\,Cl_2$), $^{1}\frac{9.33}{100}$ giving the percentage of potash (KO).

Analyses showing the amount of potash (KO) in one ounce avoirdupois of the following substances:—

	Grains.
1 oz. of baker's best bread (City)	0.259
1 oz. of best bread (West-end)	0.257
1 oz. of home-made bread, probably containing potato flour	0.262
1 oz. of best white flour	0.100
1 oz. of bran	0.609
1 oz. of rice	0.005
1 oz. of rice	0.011
1 oz. of oatmeal	0.054
1 oz. of split peas	0.529
1 oz. of raw beef	0.599
1 oz. of salt beef, raw	0.394
1 oz. of salt beef boiled (slightly salted)	0.572
1 oz. of boiled mutton	0.637
1 oz. of Dutch cheese	0.230
1 oz. of boiled potato of large size	1.875
1 oz. of raw potato (small)	1.310
1 oz. of boiled potato, without peel and well done, water containing much potash	0.529
1 oz. of onion (small)	0.333
1 fluid oz. of London milk	0.309
1 oz. of orange (not ripe) including septa	0.675
1 fluid oz. of lime juice	0.852
1 fluid oz. of lemon juice	0.846

(1). *Potash is deficient in scorbutic diets.*—This is easily proved by examining some of the dietaries of union workhouses and prisons, when the inmates have become scorbutic. Thus in the Crediton Union (see *Provincial Medical and Surgical Journal*, June, 1847), the usual weekly dietary consisted of

	Men.	Women.
Bread	102 oz.	85 oz.
Cooked meat	12 "	12 "
Soup	3 pints	3 pints
Broth	$4\frac{1}{2}$ "	$4\frac{1}{2}$ "
Cheese	8 oz.	8 oz.
Rice or suet pudding	14 "	14 "
Potatoes	$4\frac{1}{2}$ lbs.	$4\frac{1}{2}$ lbs.

If we estimate the amount of potash taken by the inmates of this workhouse, we shall find the men's food to contain about 186 grains, and the women's about 181 grains. This amount would be much influenced by the mode in which the potatoes were cooked ; if not too much boiled, and with the skins on, they would contain a much larger amount of potash than if boiled without their skins, and much done. Under this diet the inmates remained healthy ; but, owing to the scarcity of potatoes, boiled rice in equal weights was substituted, and in a few months the inmates became scorbutic. When the substitution was made, the weekly amount of potash taken by the men was about 51 grains, and by the women 46 grains, or a reduction of more than two-thirds took place. Rice and potatoes do not differ much in their composition, except in the salt of *potash* contained by the latter. Both contain starch and vegetable albumen. In the weekly diet list for the military prisoners at the Millbank Penitentiary, when they were subject to scurvy (see Dr. Baly's paper in *London Medical Gazette*, vol. i, 1841-2), we find the amount of potash taken by each prisoner during the first three months of imprisonment, to be about 44 grains ; during the second three months about 50 grains ; after six months, about 68 grains. At present, when potatoes are added, the weekly amount of potash is from 210 to 230 grains, and no case of scurvy has arisen since the change.

Again, if we examine some of the diets used by the labourers suffering from scurvy, and detailed in the last July number of this Journal, we shall perceive that the weekly amount of potash varied from 20 to 80 or 90 grains, and that this was contained chiefly in the bread, the analysis of which gave a much greater amount than the corresponding quantity of flour, thus indicating some admixture, as of alum and potato flour.

In the cases which have occurred under my care, the diets have consisted chiefly of bread, butter, little or no milk, and no potatoes, occasionally a small piece of meat, bacon, or a salt herring, and a similar diet has been found to have been used by most patients who have become scorbutic within the last year. (See paper on Scurvy by Dr. Curran, in *Dublin Quarterly Journal* for August, 1847, and by Dr. Shapter, in the *Provincial Medical and Surgical Journal*).

In the diet of sailors we find abundance of meat (salted beef and pork); but no doubt the quality of these provisions is often much impaired by the prolonged action of the salt, causing the gradual exosmosis of the potash salts, and the substitution of those of soda. In an analysis of beef which has been exposed for only a few days to the action of brine, but where the thickness of muscle was not more than $1\frac{1}{2}$-inch, there was found to be a considerable diminution of the potash. One oz. of fresh beef gave 0.599 grains of potash, one oz. of salted beef 0.394 grains ; and there can be little doubt but that a prolonged action of the brine would reduce very greatly the amount of potash salts in the largest joints. So that the sailors' weekly dietary, when no vegetables can be procured, consisting of $9\frac{3}{4}$ lbs. of salted meat, about 7 lbs. of flour in the form of biscuits, and $1\frac{1}{2}$ pints of peas, would contain about 90 grains of potash, supposing the meat such as stated above.

(2). *That all bodies proved to be anti-scorbutic, contain a large amount of potash.*—All fruits contain this substance in abundance, as oranges, lemons, limes, grapes, gooseberries, &c., and these are all highly anti-scorbutic. Potatoes also, which perhaps are the most valuable as an addition to a dietary for the purpose of preventing scurvy, and owing to the scarcity of which article this disease has been so prevalent within the last two years, contain, as the above analyses prove, a very large amount of potash, and when boiled (not too much and unpeeled) still retain most of that ingredient; this also accords with the fact, that potatoes, when cooked in the ordinary

way, are anti-scorbutic, and at the same time explains why the hard core of that tuber, which is so much liked by the Irishman, is most powerful in preventing the occurrence of scurvy, (see Dr. Lonsdale in August number of this Journal). Milk, which is undoubtedly a good anti-scorbutic, and upon which the young of animals are for some time sustained, contains a very large proportion of potash salts compared with those of soda, being an exception to the relation between these two classes of salts which is found in the other animal fluids,—a pint of milk (London) and having a sp. gr. of 1.021, containing 6.180 grains. This was probably considerably diluted, as the usual sp. gr. is from 1.026 to 1.030. Berzelius's analysis gives about 9 grains ; but the sp. gr. of the milk which he analyzed was much greater, about one-third. Fresh meat also contains potash in rather large proportion : and there is no doubt that animals, such as the carnivora, living entirely on this substance in its uncooked state, take an amount of potash quite sufficient for the wants of the system. When we examine other articles noted for preventing or curing the disease in question, we find that potash enters into the composition of all in considerable quantities ; this is true with regard to cabbages, turnips, onions, garlics, leeks, and hence their efficacy, and also of pickles and sour-krout made from them ; the same is the case with the young tops of plants, as of the *Pinus sylvestris*, *&c.*, when a decoction is made. Potash is also found in spruce beer, wort, malt liquors, wines, especially the lighter description, which contains this substance in the form of a bitartrate, but which becomes deposited in the stronger varieties.

(3). *In scurvy the blood is deficient in potash, and the amount of that substance thrown out by the kidneys is less than that which takes place in health.*—100 grains of the dried serum of healthy blood, when incinerated and heated with the bichloride of platinum, gave 1.582 grains of the double chloride of potassium and platinum. 100 grains of dried serum of scorbutic blood, treated in the same way, gave only 0.627 grains of the same salt, so that the amount of potash in scorbutic blood was little more than one-third that contained in the blood in health, although the total amount of saline matters was nearly equal. In one case, a female, at 50, complaining of great prostration of strength, spongy gums, effusion in both ankles, &c., the amount of urine passed was 22½ fluid ounces in the twenty-four hours—sp. gr. 1.015. Reaction *very* acid, and on standing deposited mucus intermixed with uric acid crystals. The amount of potash excreted in twenty-four hours, was much less than in health, being less than 7 grains ; but a slight accident prevented a very accurate determination of the quantity.

In another case, the amount thrown out in twenty-four hours was 40 oz. Sp. gr. 1.010, and acid in its reaction.

(4). *Scorbutic patients when kept under a diet which gave rise to the disease, recover, when a few grains of potash are added to their food.*—In several cases which came under my care, the treatment consisted in the daily administration of a few grains (from 12 to 20) of some salt of potash mixed with syrup and water. Sometimes the bitartrate, at other times the acetate, and also the carbonate and phosphate were used. All the salts appeared to act alike, and I have little doubt but the chloride of potassium would be found equally efficacious. When the cases were thus treated, all vegetables, milk, and malt liquors were strictly prohibited ; and yet the patients rapidly recovered. Other cases were treated by fresh vegetables and milk; these also recovered, but certainly not more quickly than those from whom these substances were withheld, and potash salts substituted. On looking over the works of several writers on scurvy, I have frequently found that some *potash* salt has been administered with *marked* benefit ; thus, nitre has been recommended, nitre dissolved in vinegar, the bitartrate of potash, the oxalate of potassa ; but the efficacy has always been ascribed to the

acid contained in these substances, and no attention has been paid to the base.

(5.) *The theory which ascribes the cause of scurvy to a deficiency of potash in the system, is capable of explaining some of its symptoms.*—Both soda and potash are constant constituents of the animal body, and it appears that they are not capable of replacing each other; for example, we always find the potash to exist in large quantities in the ash of muscle, soda in very small quantities (Berzelius, Liebig); in the ash of the blood we find the relation reversed. It appears also, that the muscular system requires the presence of potash, and we should therefore expect to find that where there is a deficient supply of this base, the effect would soon be manifested in the functions of that system. This we find to be the case in scurvy, without any amount of wasting of the body, we find marked muscular debility, and this perhaps is one of the earliest symptoms of the disease.—*Monthly Journal of Medical Science*, January, 1848.

ON THE ACTION OF ACIDS ON AMYGDALINE.

BY WÖHLER.

The composition of amygdaline is expressed by the formula $C_{40}\ N_{27}\ NO_{22}$. There can be no doubt that it is one of the so-called accoupled compounds. From the circumstance that under the influence of emulsine, it is resolved into sugar, prussic acid, and oil of bitter almonds, it might be supposed that it actually contains these substances as proximate constituents, for

1 equivalent	of oil of bitter almonds	C_{14}	H_6		O_2
1	" of prussic acid	C_2	H	N	
2	" of sugar	C_{24}	H_{20}		O_{20}
Yield 1	" of amygdaline	C_{40}	H_{27}	N	O_{22}.

It might, however, also be regarded as a compound of cyanuret of benzoyle $C_{14}\ H_5 + C_2\ N$, with two atoms of gum:

1 equivalent	of benzoyle	C_{14}	H_5		
1	" of cyanogen	C_2		N	
2	" of gum	C_{24}	H_{22}		O_{22}
		C_{40}	H_{27}	N	O_{22}.

During its conversion, the elements of two atoms of water would separate from the gum, and combine with the cyanuret of benzoyle, when the gum would appear as sugar, and the cyanuret of benzoyle as prussic acid and oil of bitter almonds. The action of acids on amygdaline agrees completely with both views. They convert it into formo-benzoic acid and a humus-like substance, while the whole of the nitrogen is separated in the form of a salt of ammonium. The same results are obtained by acting separately on prussic acid and either sugar or gum, by acids. For the sugar or gum yields the humus-like substance, and the formic acid obtained from the prussic acid combines with the oil of bitter almonds, and produces formo-benzoilic acid. I have only tried the effects of hydrochloric acid; but there can be no doubt that the same results would attend the use of all the stronger acids.

A solution of amygdaline in fuming hydrochloric acid, readily becomes yellow and brown when heated, and when subjected to a higher degree, deposits a large quantity of a blackish-brown, pulverulent, humus-like substance.

If the brown liquid, separated from the humine by filtration be evaporated in a water-bath, a blackish-brown syrupy mass remains behind,

which is a mixture of humic acid, sal ammoniac, and formo-benzoilic acid. By ether, the latter may be extracted and crystallized in large tabular rhombohedra. The solution being heated with binoxide of manganese, immediately developed carbonic acid and oil of bitter almonds. The analysis, both of the acid and of the crystallized silver salt, likewise showed that it was nothing but formo-benzoilic acid.

If the acid liquid be evaporated at a higher degree than 212°, part of the formo-benzoilic acid undergoes some change, which deserves further attention. Formo-benzoilic acid, obtained from bitter almond-water, also undergoes the same change. It becomes amorphous, and, although it forms with a small quantity of water a solution, yet it is precipitated upon the addition of more water, in the form of a heavy, yellowish, inodorous oil.

From the mass exhausted by ether, a quantity of crystallized sal-ammoniac was obtained.

With the view of obtaining directly from amygdaline the ether of formo-benzoilic acid, hitherto unknown, hydrochloric acid gas was passed into a paste-like mixture of alcohol and amygdaline. In proportion as the mass became saturated and heated by it, the amygdaline gradually dissolved, forming a perfectly clear solution, without separating again when cold. No gummy substance was formed on this occasion, and the liquid was but slightly coloured brown. After a few days a pulverulent salt separated, which was sal-ammoniac, the quantity of which was increased by the addition of ether. Upon the addition of a large quantity of ether, an aqueous acid liquid separated, which contained the whole of the sal-ammoniac, but no sugar. After repeatedly shaking it with ether, the ethereal solution was removed, and the ether distilled off. A brown syrup remained behind, which, upon the addition of water, sank to the bottom in the form of a heavy fluid. I have not examined this substance more closely, but it is probably the ether of the amygdalic acid, formed by the sugar or gum in the amygdaline not being converted into humine, but combining themselves with the generated formo-benzoilic acid. For amygdalic acid, $HO + C_{40} H_{26} O_{24}$ is so composed, that it may be considered as a combination of

1 equivalent	of oil of bitter almonds	$C_{14} H_6 O_2$
1 "	of formic acid	$C_2 H O_3$
2 "	of sugar	$C_{24} H_{20} O_{20}$
		$C_{40} H_{27} O_{25}$

Amygdalic ether is undoubtedly colourless in the unaltered state. Obtained in the above manner, it is light brown, heavier than water, with which it is not miscible, but soluble in it to a considerable extent, particularly if heated, when it at the same time becomes decomposed. It has a bitter astringent taste, and is not at all, or but slightly volatile.—*Annalen der Chemie.*

ON THE SEPARATION OF ANTIMONY FROM ARSENIC.

BY C. MEYER.

The following method of separating antimony from arsenic, which is especially available for forensic purposes, is founded on the insolubility of the antimoniate of soda, and on the conversion of arseniferous antimony into arseniate and antimoniate of soda. I first ascertained the insolubility of calcined anhydrous antimoniate of soda. When antimony is deflagrated with nitrate of soda, and the mass exhausted with cold water, no antimony is discoverable in the liquid. The residual antimoniate of soda is NaO, SbO_5, and anhydrous.

If a solution of antimoniate of potash be precipitated by sulphate of soda and the liquid after some time filtered, no antimony can be detected in it. The crystalline precipitate is according to analysis also NaO, SbO_5, but contains 6 atoms or 21.23 per cent. of water: experiment gave 21.5.

The antimony was estimated partly by precipitating it by sulphuretted hydrogen from a solution of the salt, in a mixture of hydrochloric and tartaric acids, partly by Rose's method, by heating the salt with sal ammoniac: this gave the most accurate result. This anhydrous salt is not quite insoluble in boiling water. In order to ascertain the applicability of the insolubility of the calcined antimoniate of soda to its separation from arsenic, a given weight of pure antimony was mixed with arsenic and the mixture deflagrated with three times its weight of a mixture of nitrate and carbonate of soda.

The mass being treated with cold water and heated yielded a quantity of antimoniate of soda, which agreed exactly in weight with the quantity expected according to calculation. The salt, when tested by the blowpipe, was found to be perfectly free of arsenic.

The arsenic was precipitated in the usual way by sulphuretted hydrogen from the solution and estimated: its quantity also agreed almost perfectly with that employed.

Further 0.10 grains of emetic tartar and the same quantity of arsenious acid were dissolved in thick soup, the organic substances destroyed as much as possible by the long-continued passage of chlorine through it, the heated liquid filtered, the mass on the filter well-washed, the solution saturated with sulphuretted hydrogen and left for some time in contact with it; the precipitate filtered, washed, then dissolved along with the filter in hot nitric acid, the solution saturated with carbonate of soda, a small quantity of nitrate of soda added, evaporated, and the whole mass then heated in a porcelain crucible till the sulphur compounds and the organic matter were completely oxidized and the mass finally fused.

The mass was then exhausted with water and 0.087 grains of antimoniate of soda obtained. According to calculation there ought to have been 0.058 grains.

The solution which contained the arseniate of soda, was evaporated to dryness, all carbonic, nitric, and nitrous acids removed by concentrated sulphuric acid; the salt dissolved in water mixed with sulphurous acid; and after expelling the latter, the arsenic was precipitated by sulphuretted hydrogen.

In order to get rid of the free sulphur the precipitate was dissolved in very dilute ammonia, and re-precipitated by sulphuric acid. It weighed 0.120 grains, which corresponds to 0.096 per cent., and is consequently very near the quantity of arsenious acid employed.

This insolubility of the antimoniate of soda was successfully applied to the preparation of antimony free from arsenic. The method of proceeding is only a modification of that recommended by Wöhler. It is very probable that those who object to this method have employed in their experiments carbonate of potash instead of carbonate of soda.

Commercial antimony was fused with $\frac{1}{4}$ of its weight of arsenic; the pulverized regulus mixed with $1\frac{1}{4}$ parts of crude nitrate of soda (Chili saltpetre), and $\frac{1}{2}$ part of carbonate of soda, gently heated, and the whole treated with water. The residual antimoniate of soda, was, when dry, fused with half its weight of cream of tartar, and thus a very beautiful white regulus was obtained, which did not give the least arsenical smell before the blowpipe, and was remarkable for the facility with which it continued to burn away. The regulus thus obtained contained neither sodium nor potassium, which latter it usually contains when reduced from antimoniate of potash.—*Annalen der Chemie.*

POISONING PROPERTIES OF COMMON PARSNIP. (*PASTINACA SATIVA*).

Dr. Pupcke of Giessen, states, that at the latter end of March, 1847, seven children were poisoned in consequence of eating some boiled roots of the *Pastinaca sativa*, growing wild. The symptoms were illusions, loss of consciousness, quiet delirium, giddiness, staring look, change of the colour of the face, breathing somewhat difficult and slow, suppressed [*unterdrückter*] beating of the heart and pulse, and almost uninterrupted attempts to get out of bed. The illusions were confined to vision, and the patients stared and grasped at imaginary objects in the air, &c. Some of them did not speak at all; others only indistinctly or incoherently. Two of them uttered inarticulate sounds. The irritability of the gastric nerves appeared in all of them to be much depressed, for emetics in double the usual doses had no effect. But after repeated doses of a concentrated aqueous solution of sulphate of zinc, vomiting was effected, and perfect re-convalescence followed in a few days*.

This is a new proof that a poisonous constituent, perhaps an alkaloid, is developed during the spring of the second year, on the approach of the flowering season, in the root of the parsnip, which in the autumn and winter of the first year, is sweet and harmless. Comparative chemico-physiological experiments on this point, would be very interesting. At the same time the seeds should be examined.—*Buchner's Repert.* No. 147, p. 363.

ON THE CHEMICAL NATURE OF A WAX FROM CHINA.

BY BENJAMIN COLLINS BRODIE, ESQ.

Communicated to the Royal Society by Sir Benjamin Brodie, Bart., F.R.S.

The wax which is the subject of this investigation, is a substance imported into this country from China. It has the general appearance of spermaceti, but is harder than that body. The author gives reasons for believing that this wax, like bees'-wax, is a secretion from an insect.

The wax may be decomposed by fusion with hydrate of potash, by which process two substances are procured; namely, a wax acid, which, combined with the potash, forms a soap; and another body which is dissolved in the soap solution. By precipitation with chloride of barium and washing out the dried baryta salt with ether, or other suitable solvents, the two substances may be separated.

The substance dissolved in the ether has the appearance of a wax. By crystallization its melting-point may be raised to 79° C., at which point it is fixed. The body, when analysed, gave numbers agreeing with the formula $C_{54}\ H_{56}\ O_2$, the formula, namely, of the alcohol of cerotic acid, the acid which in a previous paper the author has shown to exist in a free condition in bees'-wax, and the constitution of which he there determined. To this alcohol the author gives the name of *cerotine*. By oxidation, by means of lime and potash, the alcohol is capable of being converted into cerotic acid, $C_{54}\ H_{54}\ O_4$. The analyses of the acid and of its silver salt are given. The formula of the alcohol is further confirmed by the analysis of its combination with sulphuric acid; and the process to be employed to procure this substance is detailed. Its formula is $SO_3, C_{54}\ H_{55}\ O + HO$; the sulphate of the oxide of cerotyle, using the usual chemical-language to express the nature of the combination. By the action of chlorine on

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* [The symptoms here described as being produced by the common parsnip, greatly resemble those caused by belladonna.—*Ed. Pharm. Journ.*]

the alcohol, the alcohol-type is destroyed, and a body is formed, analogous to chloral, containing two equivalents of hydrogen less than the alcohol itself. The analyses lead to the formula

$C_{54}\left\{\begin{matrix}H_{40\frac{3}{4}}\\Cl_{13\frac{1}{4}}\end{matrix}\right. O_2$. The substance has the appearance of a resin.

By decomposing the above-mentioned baryta salt, after the cerotine has been entirely removed by washing with suitable solvents, the same cerotic acid may be obtained as that into which the alcohol itself is converted by oxidation. The analysis of the acid and of its silver salt is given.

This Chinese wax cannot be distilled without decomposition. By its distillation two substances are procured; cerotic acid, $C_{54}\,H_{54}\,O_4$, and hydrocarbon. The hydrocarbon consists principally of a solid matter, one of those substances which, in the opinion of the author, have been indiscriminately classed together under the general name of *paraffine*. This substance, to which he gives the name of *cerotine*, contains equal equivalents of hydrogen and carbon, and has the formula $C_{54}\,H_{54}$. This formula is determined with precision by the action of chlorine on the substance, which gives rise to a series of products of substitution, of which several were analyzed, namely the substances

$$C_{54}\left\{\begin{matrix}H_{33}\\Cl_{19},\end{matrix}\right. \qquad C_{54}\left\{\begin{matrix}H_{33}\\Cl_{21},\end{matrix}\right. \qquad C_{54}\left\{\begin{matrix}H_{32}\\Cl_{22}.\end{matrix}\right.$$

The density of the vapour of cerotine cannot be taken, as, by distillation, it is decomposed. The experiment was made of distilling and redistilling the substance in a sealed tube, in which cases it passes entirely into fluid and gaseous hydrocarbon.

The analysis of the Chinese wax itself corresponds with the formula $C_{108}\,H_{108}\,O_4$, which admits of a simple explanation of the nature of its decompositions: its decomposition by potash being explained by the equation

$$C_{108}\,H_{108}\,O_4 + KO\,HO = (C_{54}\,H_{53}\,O_3 + KO) + C_{54}\,H_{56}\,O_2,$$

and its decomposition by heat by the equation

$$C_{108}\,H_{108}\,O_4 = C_{54}\,H_{54}\,O_4 + C_{54}\,H_{54},$$

the substance itself belonging to the class of compound ethers.

The author announces his intention of following up this paper by a third on the constitution of myricine.

A COMPARATIVE ANALYSIS OF THE WATER OF THE RIVERS MAINE AND LOIRE,

TOGETHER WITH THAT OF MANY WELLS AND SPRINGS IN THE VICINITY OF ANGERS,

Presented to the Society of Agriculture, Science, a nd Art, of that place, on the 7th of November, 1835.

BY M. MORREN.

From the Mémoires de la Société d'Agriculture, Sciences, et Arts d'Angers. Deuxième livraison, vol. ii., p. 125. Angers: de l'imprimerie de Victor Pavie, 1836.

A QUESTION of considerable importance has been agitated during the past year, namely that of making our town fountains capable of supplying the inhabitants with an abundance of wholesome water, in place of the unwholesome water of the wells which for the most part constitutes the ordinary drink of the great majority of the Angerins.

The water of the Loire has ever enjoyed among us a popular celebrity, resulting, doubtless, from the robust health of those who drink it, and the flourishing population which inhabits the margin of the river; but this water must be brought to Angers from a remote distance. The water of

the Maine on the contrary, is at our doors; hence many, and those especially who reside on its banks, make use of it. Some extol, while others proscribe its use. Hence we have viewed with deep interest experiments calculated to demonstrate clearly and precisely what is the cause of that preference which should guide us in the choice of water for the consumption of our town. In the first part of this task I have been aided by the enlightened co-operation of M. Godfroy; but towards the conclusion, his numerous engagements deprived me of this great advantage. I was deeply impressed with the importance of conducting my experiments with the most rigorous accuracy, because of the powerful influence they were calculated to exert in our selection of the springs to be established.

I will not deny that, at the commencement of my labours, I entertained a strong prepossession in favour of the waters of the Maine, which I regarded as little, if at all inferior, to those of the Loire, an opinion which I did not scruple to express to many, to whom I said it derived countenance from the result of our experiments. In this, nevertheless, we were deceived, as the final results of our experiments clearly demonstrate.

These experiments were not made with a view to determine the quantity of saline contents of the waters of the Maine and Loire respectively, since this had already been sufficiently ascertained by previous analysis, by competent persons. I shall content myself with simply remarking, that it is not strictly correct to say absolutely that the water of the Maine is turbid and greenish. These are qualities which may present themselves to the chemist at the time of making his examination. Sometimes indeed I have found such to be the case; but more frequently, especially in spring, and even in autumn, I have found the water of the Maine limpid and transparent, although at other times yellowish and turbid. It is sufficiently variable in its appearance, the reason of which will be clear to those who take the annual and varied causes which operate upon it into account.

Our attention was chiefly directed to the nature and quantity of the gases held in solution by the water of the two rivers respectively. To show the importance of this element to the quality of water, I would remark how raw, vapid, and disagreeable to the taste those waters are which have been deprived of their air by boiling.

According to the experiments of MM. Gay Lussac and Humboldt, good water contains about one-twenty-fifth of its bulk of air, having thirty-two per cent. of oxygen. This we have assumed as the standard of comparison for those waters which we have subjected to examination.

In the first eight days of June this year (1835) an extraordinary flood in the Loire raised the waters of the Maine much above their usual level. The adjoining meadows were inundated, and all who visited the banks of the river must recollect to have seen its waters covered with the remains of larvæ, insects, drowned animals, and a vast quantity of fragments of vegetables, the most brittle, such as the *Equisetum fluviale*, more especially. It may also be recollected that at this time nearly the whole of the fish of our river became weak and sickly, came to the banks to die, or suffer themselves to be taken by the hand, by multitudes chiefly of children who crowded to the river for this purpose. The authorities of the town even prohibited the use of this fish as injurious to health. We selected this period for the commencement of our experiments, hoping thus to effect a double object, and ascertain the cause of the extraordinary poisoning of the fish. The result was, that we ascertained that the water, at this period, contained air twelve-hundredths less pure than usual; so that the fish perished, not only from being gorged with semiputrid and unwholesome food, but also from breathing an impure air.

We cannot be blind to the fact, that, under these circumstances, the water of the Maine was materially deteriorated by the animal and vege-

table substances it contained; but the Loire was almost similarly circumstanced, modified indeed by the rapidity of its current. Besides a town cannot suspend the use of its fountains; the water it consumes should be examined in all possible conditions, and on this account our examination was continued almost without interruption from the beginning of June to the end of August.

The water for examination was almost invariably taken at the same hour. That of the Maine from the very centre of the stream at la Haute Chaîne. That of the Loire was taken, for our first experiments, from the main stream, opposite the lower part of the Isle du Chateau, and for the last, from the main channel, an hundred paces above the first arch of the second branch. The density and temperature of these waters almost invariably corresponded. Both were alternately introduced into a glass globe holding 2 litres 232. A bent tube, fitted to this globe, allowed the air disengaged by a regulated temperature, carried to ebullition and continued gently for an hour, to be collected. The same vessels and the same precautions were employed in all the other experiments. The gas collected was reduced to the same temperature and pressure, then measured, after which it was passed through a solution of caustic potash to separate the carbonic acid, and then re-measured. Afterwards 100 parts of the gas thus washed, with 150 parts of pure hydrogen, perfectly freed from oxygen by detonation, were introduced into an eudiometer, with a suitable portion of this last gas. After detonation in the eudiometer the residue was carefully measured, so as to determine the quantity of oxygen it contained, to an hundredth part. We enter into these minute details to enable those who are familiar with such manipulations to place more reliance on the results we obtained. The numbers, which indicate the quantity of oxygen and carbonic acid, are the mean of three or four, and often of more, experiments, which only differed from each other in the third figure.

On the 19th of June the water of the Maine yielded 15.83 measures of gas*, containing 12 per cent. of carbonic acid gas, and 20 per cent. of oxygen. That of the Loire gave 13.87 m. of gas, containing 3.03 per cent. of carbonic acid gas, and 30.29 per cent. of oxygen.

On the 20th of June, the water of the Maine furnished 14.06 m. of gas, containing 12.76 per cent. of carbonic acid gas, and 24.40 per cent. of oxygen. That of the Loire 13.99 m. of gas, containing 3.03 per cent. of carbonic acid gas, and 30.57 per cent. of oxygen.

On the 23d of June, the water of the Maine gave 14.06 m. of gas, containing 12.75 per cent. of carbonic acid gas, and 23.81 per cent. of oxygen. That of the Loire 13.297 m. of gas, containing 3.02 per cent. of carbonic acid gas, and 32.38 per cent. of oxygen.

On the 25th and 26th we obtained results almost precisely similar.

On the 30th of June the water of the Maine gave 16.912 m. of gas, containing 11 per cent. of carbonic acid gas, and 29.77 per cent. of oxygen. That of the Loire, 16.65 m. of gas, containing 235 per cent. of carbonic acid gas, and 32.28 per cent. of oxygen.

On the 6th, 7th, 8th, 11th, and 13th of July we obtained similar results. The water of the Maine appeared to have returned to its normal state. Its air then contained 30.69 per cent. of oxygen, but at all times a considerable quantity of carbonic acid. I even found it on the 13th to amount to 21.20 per cent. The results were similar on the 16th and 18th of July.

After this I omitted my experiments, conceiving that the results would

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* The measure (m.) was equal to 0.048 litres. In order to have corresponding results, it was necessary to indicate the carbonic acid gas and oxygen in this manner.

be uniform ; but having occasion to make a comparative experiment with the water of a spring and of a well, and to repeat the analysis of that of the Maine, I found the latter to yield, on the 1st of August, 15.58 m. of gas, containing 5 per cent. of carbonic acid, and only 20.82 per cent. of oxygen. I was, therefore, obliged to resume my analyses, and I found, as before, that while the water of the Loire continued in an invariable state, that of the Maine yielded air containing only 20.82 per cent. of oxygen ; but gradually resumed its normal state, as the cause of disturbance subsided. At this time I again observed numbers of dead fish on the banks, but by no means so numerous as those in the beginning of June. The annexed table exhibits at one view the series of these results :

Date of Experiment.	Centesimal content of Oxygen.		Centesimal content of Carbonic Acid Gas.		Measures of Air obtained.		Atmospheric Pressure Metres.
	Loire.	Maine.	Loire.	Maine.	Loire.	Maine.	
June 19	30.29	20.89	3.02	12.00	13.87	14.835	0.7662
" 20	30.57	24.40	3.03	12.76	13.99	14.06	0.7650
" 23	32.38	23.81	3.02	17.75	13.297	14.96	0.7600
" 25	32.30	23.70	3.02	12.70	13.287	14.90	0.7570
" 26	32.39	24.80	3.04	12.72	13.40	14.95	0.7662
" 30	32.28	29.77	2.35	11.00	16.65	16.912	0.7631
July 6	32.35	29.80	2.01	10.02	16.50	16.80	0 7673
" 7	32.40	29.83	2.01	10.02	16.45	16.82	0.7687
" 8	—	29.80	—	14.00	—	16.92	0.7676
" 11	—	29.82	—	12.00	—	16.80	0.7693
" 13	—	30.69	—	21.20	—	19.525	0.7653
" 16	—	30.80	—	20.00	—	18.40	0.7631
" 18	32.41	30.75	3.22	19.20	17.40	18.20	0.7654
" 19	—	—	—	—	—	—	0.7690
" 20	—	—	—	—	—	—	0.7636
August 1	32.03	20.82	2.00	5.00	15.02	15.58	0.7625
" 3	—	24.03	—	7.21	—	15.57	0.7624
" 5	—	27.34	—	9.80	—	16.49	0.7630
" 8	—	29.02	—	10.00	—	17.80	0.7694
" 11	32.40	30.01	2.21	9.60	16.60	16.90	0.7656

We see clearly by this table that from June to August inclusively, the water of the Loire underwent but slight changes, which were promptly repaired, its taste continuing agreeable. While, on the contrary, that of the Maine, the taste of which is always slimy and disagreeable, and the smell frequently repulsive (at the time of the first flood) had been greatly vitiated, and recovered its salubrity but slowly. It is easy at least to assign some causes for the effects experienced from the waters of the Maine : some of these are accidental and of rare recurrence ; others, on the contrary, are periodical, and will incessantly recur. The water of our river frequently overflows the bordering meadows—stagnant there for a length of time, it becomes loaded with animal and vegetable remains, which, as the waters subside, run sooner or later into a state of decomposition, along the whole course of the stream, which is sluggish at all seasons. Moreover the water lingers long off the landing-places, and on muddy bottoms favourable to the growth of aquatic plants. The effect of such a stagnation can well be conceived. Thus the water of the Maine always has, in summer especially, a muddy taste, which even filtration cannot always remove. Moreover, and this is of deep importance for the

establishment of fountains, the unfiltered water of the Maine, kept for some time to become clear, on account of the vegetable matters it retains in a state of suspension, undergoes a sensible but modified change, according to the season, in the purity of the air it contains. That of the Loire, on the contrary, preserves its purity better, and for a much longer time.

Before I recapitulate the results of this examination, I shall give an analysis of the water of some of the wells and fountains of Angers. The following numbers indicate their respective densities, that of distilled water being assumed as unity.

Distilled water	1.000000
Water of the Maine	1.000485
That of one of the wells of the Prefecture adjoining the Rue de Lices	1.000787
That of a well in the Place St. Martin	1.000841
Of the fountain Pied-Boulet	1.000845
Of one of the college wells	1.001543
Of a fountain in the Rue de l'Ecorcherie	1.001543
A well belonging to M. Godfroy	1.002101

On the 8th of July I boiled some water taken from the pump of the college kitchen ; it yielded 34.32 m. of gas. The unity of the measure was the same as in the former experiments, and I employed the same vessels. This gas contained 49.46 per cent. of carbonic acid gas, and 24.28 per cent. of oxygen. On the 9th of July, water taken from the pump of the great court of the college, gave 50.56 m. of gas, containing 58.38 per cent. of carbonic acid, and 21 per cent. of oxygen. In both these experiments, as well as some which will follow, the water, after boiling, became turbid and muddy, and next day I found the receiver encrusted with a deposit of carbonate of lime. The large quantity of carbonic acid contained in these waters, served to dissolve the otherwise insoluble carbonate of lime.

On the 11th, water taken from the pump of the college infirmary, gave 32.80 m. of gas, containing 47.16 per cent. of carbonic acid, and 18.75 per cent. of oxygen. This is the smallest quantity of oxygen met with in the course of these experiments.

On the 16th, water from the pump of the drug shop of M. Godfroy, yielded 59.23 m. of gas, containing 73 per cent. of carbonic acid, and 21.20 per cent. of oxygen.

On the 30th of July, water from the fountain of Pied Boulet, in the Rue Baudriere, gave 19,58 m. of gas, containing 2.50 per cent. of carbonic acid, and 31.46 per cent. of oxygen.

On the 31st of July, water from the fountain in the Rue de l'Ecorcherie, yielded 19.50 m. of gas, containing 1 80 per cent. of carbonic acid, and 30.79 per cent. of oxygen. Hence in arranging these according to the amount of oxygen they contain, we shall have them in the following order:

1. Fountain of the Rue Baudriere.
2. That of the Rue de l'Ecorcherie.
3. Water of the pump of the college kitchen.
4. Water of a well in the Place St. Martin.
5. That of a pump in the great court of the college.
6. That of M. Godfroy's pump.

It is interesting to observe how much the percentage of carbonic acid varies ; it abounds most where the oxygen is most deficient, and appears to be proportionate to the bad quality of the waters, and the larger the quantity of this gas the waters contain, the harder and more unpalatable they are. Moreover, on separating from each gas its variable content of carbonic acid, the residue is a constant quantity of between 16 and 17 measures, or nearly $\frac{1}{2\,3}$ of the volume of water employed.

To sum up the results of this analysis, we have found the air from the waters of the Loire uniformly purer than that of the Maine. That in this last, the proportion of oxygen is subject to great variations, which disappear slowly. That the water of the Loire hardly holds in suspension more than the siliceous particles, which subside easily and completely in a day or two, while that of the Maine is almost constantly loaded with vegetable matter, which affects its taste, and by decomposition, impairs the purity of its air. We have no doubt that the difference between the water of these rivers is least in winter and spring, a point I hope to clear up. We must not, however, imagine that we can, by mere filtration, obtain as wholesome a beverage from the water of the Maine as from that of the Loire, and in this respect I regard all experiments as illusory.

In fine, and we would call the attention of all to this last point—with the exception of one or two small fountains, the water of which contains air of sufficient purity, they are all loaded with a redundance of salts; the water of all the wells of Angers is more or less hard, selenitic, and unwholesome, and its use highly prejudicial to health, that of strangers more especially, and this even when drawn from the best wells. It would be beneficial to substitute for them the waters of the Maine, and still more those of the Loire. Should it then be proposed to establish fountains at Angers, these would be best supplied from the Maine, and still more beneficially from the Loire.

PRESERVATION OF SWEET SPIRITS OF NITRE.

BY KLOUR.

When *Spiritus Ætheris Nitrosi* has become acid it is generally rectified from calcined magnesia; but this does not prevent its again becoming acid in a few weeks. Klour states that if neutral tartrate of potash be substituted for magnesia the spirit does not again acquire acidity. According to his experience Sp. Æth. Nitrosi rectified in this way can be preserved for months without giving a trace of acidity.—*Buchner's Repertorium*, No. 147, p. 363.

WHICH OF THE CONSTITUENTS OF RHUBARB IS EXCRETED IN THE URINE?

BY DR. SCHLOSSBERGER.

In communicating the results of a chemical examination of rhubarb root which I undertook with Dr. Döpping (see *Pharmaceutical Journal*, vol. iv., page 136.), we showed that this important medicine contains besides ligneous fibre, tannin, gallic acid, sugar, pectin, oxalate of lime, and inorganic salts, three colouring matters, which hold an intermediate position between resins and the so-called extractive matters. We denominated the two uncrystallizable but mutually related colouring matters obtained from rhubarb *brown resin* and *red resin* (*Phaeoretin* and *Erythoretin*); and we at the same time showed that the third colouring matter, which can be obtained in the form of granular crystals, represents a weak acid, which, according to its elementary composition and chemical relations proved to be perfectly identical with the yellow acid of *Parmelia parietina*, which Rochleder and Heldt had denominated *Chrysophanic acid*. For this acid, which is distinguished by its crystallizability, by the difficulty with which it is destroyed, and by its magnificent purple colouration by alkalies, we thought it necessary, in order to avoid confusion, to preserve the above-mentioned name, although Berzelius (*Jahresbericht*, 1846, p. 678) has proposed to change its name to *Rheic acid*. This appeared the more proper, since formerly almost all the names formed from the words *rhubarb* and *rheum* (such as *rhein*, *rheumin*, *rhubarb-yellow*, *rhubarbic acid*, &c. &c.), were given to sub-

stances which, according to our experiments, were mixtures of the above-mentioned three colouring matters, with perhaps some products of decomposition (often also humic substances, according to Berzelius).

Now it has been long known that during the internal use of rhubarb the urine appears variously coloured, and yields often very peculiar sediments, and Heller (in his *Archiv.* 1847, Heft. 1, p. 1) has distinctly shown that these colourations vary chiefly, according to whether the urine, at the time of its being examined, was acid or alkaline. The urine passed after taking rhubarb, if acid, always possesses merely a yellow colour of various tints ; but if naturally alkaline, or if made so artificially, it always appears reddish yellow, and even red like blood. However, neither Heller nor any other Chemist have made experiments to examine which colouring matter of rhubarb chiefly, or, perhaps, exclusively, causes this colouration of the urine, or whether all three equally contribute to it. Heller speaks only of the rhein of Geiger and Vaudin ; but the yellow substance obtained by these gentlemen does not, perhaps, pre-exist in rhubarb ; but as Dulk suspected, and as appears very probable from his method of forming it (the continued digestion of rhubarb with nitric acid, &c.), it is only the product of decomposition (perhaps of oxidation) of one or more of the colouring matters contained in it.

I have, therefore, with the view of ascertaining which of these substances is contained in the urine, made several experiments, some with phaeoretin but particularly with erythroretin, others with the *Parmelia parietina* (which was formerly well known as an excellent substitute for bark, but has now entirely disappeared from the materia medica). It appears to me very probable that it is the two *uncrystallizable* colouring matters of rhubarb, which particularly impart to the so-called rhubarb-urine its colour. I do not, however, venture to give my opinion as to whether they pass unchanged or somewhat modified in this excretion. If phaeoretin or erythroretin be taken either separately or mixed, the urine becomes much impregnated with the colouring matter after a few doses (particularly if given in a weak alkaline solution). The urine is of a light yellow colour so long as it is acid, but reddish-yellow to brownish-red if it has become alkaline by vegetable food, by the addition of ammonia, or by allowing it to putrify. The sediments of earthy phosphate are reddish, passing into violet. A solution of both resinous substances in ammoniacal water, yields by the addition of a muriatic solution of earthy phosphates (as well as of acetate of lead) an abundant brownish-red or violet-red precipitate.

These observations show that the two *uncrystallizable* colouring matters of rhubarb, when taken internally, communicate to the urine the characteristics which Heller has described. This showed itself most distinctly with erythroretin. The smell of rhubarb, which these substances do not possess, was not, however, distinctly perceptible in the urine. But it is well known that even after taking rhubarb in substance, the odour of the urine varies much, and depends probably on diet and mode of life.

The *chrysophanic acid*, when *perfectly deprived* of the brown resin and red resin, only slightly influences the colouration of the urine. Schramm made in this respect, numerous experiments on his own person. He took a solution of chrysophanic acid, which he had prepared by digesting *Parmelia parietina* with solution of carbonate of potash. This solution had nearly the colour of *tinctura rhei aquosa*, but it did not in the least operate upon his bowels, and the urine secreted afterwards had scarcely any trace of colour, even when made perfectly alkaline ; neither were the earthy phosphates precipitated of a reddish-colour. But after taking *tinctura rhei aquosa*, in which, besides chrysophanic acid, also phaeoretin and erythroretin are dissolved, the urine presented precisely the same colour as that of the genuine rhubarb urine.—*Ann. Chem. und Pharm.*, lxvi.

ECONOMICAL PREPARATION OF OXIDE OF ANTIMONY.

BY M. E. G. HORNUNG.

M. Froderking having published a process for the preparation of oxide of antimony by acting on the metal with sulphuric acid, I was anxious to ascertain whether the same process could not be adopted, substituting the sulphuret of antimony for the metal.

Fifteen parts of sulphuret of antimony in fine powder were mixed with thirty-six parts of sulphuric acid in an iron vessel, and the mixture exposed to a gentle heat during a night. The mixture had become thick; but on elevating the temperature and stirring it, it again assumed a liquid condition. After continuing the action for some time the mass acquired a whitish appearance, a portion of sulphur separated in the fused state, and much sulphurous acid was disengaged; the heat and agitation were continued until in this way the whole of the sulphur was burned out and sulphurous acid no longer disengaged. Water was now added to wash out the free sulphuric acid which remained, and the residue of subsulphate of antimony was decomposed with carbonate of soda, leaving oxide of antimony in the form of a greenish white powder.

Fifteen parts of sulphuret yielded thirteen parts of dry oxide, which, with the exception of a small quantity of impurity, dissolved in solution of tartaric acid.

This is the most economical method of preparing oxide of antimony intended for the manufacture of emetic tartar.—*Archiv. der Pharm.* and *Journ. de Pharm.*

ON A COMMERCIAL CINCHONA BARK, SOLD AS YELLOW BARK.

Reichel, Apothecary in Hohenstein, has examined a bark, which in 1846 was sent from Hambro' as yellow cinchona (*China regia*). It is from 1 to 4″ thick, about the size of a quill to 1½ inches, and from 3 to 18 inches long. The closed quills are more or less rolled. The bark and alburnum are hardly wanting; in some closely rolled pieces, the epidermis is absent, beneath which is a partially firmly adhering stratum of a reddish-brown liber to be seen. The lichens chiefly to be found on it, are,—*Lepra flava* and *farinosa*, *Graphis aurantiaca*, *Gr. subcurva*, *Gr. subbifida*, *Gr. elongata*, *Tripethelium clandestinum*, *Lecidea rubrica*, *Lecanora punicea*, *Lec. pallide-flava*, *Lec. farinoso-marginata*, *Lec. atra*, *Parmelia adressa*, *Usnea cinchonarum*. Both the older and the fresher barks have small, not deeply penetrating, longitudinal cracks of unequal length. The transverse cracks in the older bark are from a quarter to half an inch distant from one another, in the younger, one inch. The edge of the transverse cracks is, according to the age of the bark, more or less elevated, by which the bark has a lacerated appearance. The principal colour of the bark is gray, but very frequently also lighter, in consequence of the *Lepra farinosa*. The inner surface is of a light rusty colour, but not so brown as in the yellow bark, the fibres also are much finer than in the latter. The transverse fractures are tolerably smooth, towards the interior surface splintery and paler. The longitudinal fracture is very smooth and without fibres. Most of the quills are perfectly rolled. The smell is that peculiar to barks; the taste at first acid, but afterwards astringent bitter. It is easily perceived that the bark has been treated with great care. All external marks, and also the chemical properties of the bark show, that this bark, which is sold as yellow bark, is the real *Pseudo loxa*, or dark Jaen cinchona of large size and good quality. There are found mixed with it single quills of Huamalies, genuine yellow bark, and quills of *Cinchona suberosa*.

The decoction of the bark yields with ammonia a dark brown cloudiness;

with iodide of potassium whitish cloudiness, and a scanty loose precipitate; with sulphate of protoxide of iron, it assumed a grass-green colour, and yielded afterwards a blueish green precipitate; with emetic tartar a yellowish precipitate; with nitrate of baryta no precipitate; with sulphate of copper it became slightly clouded; with sulphuric acid it subsequently became slightly opalescent; with corrosive sublimate a deep yellowish white precipitate; with gallic acid a brownish precipitate; with gelatine a complete precipitation in the form of a yellowish, brown, flaky, viscid mass; with oxalate of ammonia, an inconsiderable white precipitate; with tartaric acid and bicarbonate of soda, it became brown and formed a distinct yellow precipitate; with caustic lime a yellowish precipitate, which was partly soluble in excess; with caustic potash a whitish precipitate and brown colouration, partly soluble in excess; with caustic soda a strong brown colouration, without precipitate; with chloride of calcium no reaction; with chloride of lime an abundant white precipitate, soluble in excess; with chloride of platinum a very voluminous precipitate; with ferridcyanide of potassium a very brownish precipitate, which dissolved almost perfectly in excess, and re-appeared again on the addition of ammonia; with carbonate of ammonia a yellowish precipitate, partly soluble in excess.

In a quantitative analysis of the bark were found:—

	In 3 ounces. = 1440 gr.	In 1 lb. = 16 ounces.	In 100 parts
Wax	3.6	19.20	0.25
Soft resin	10.4	55.46	0.72
Chlorophylle	8.0	42.66	0.56
Hard resin (red cinchonia)	109.0	581.33	7.57
Tannin (pure)	59.0	314.66	4.10
Colouring matter (resinous)	18.0	96.00	1.25
——————— (astringent)	25.8	137.60	1.70
——————— (yellow)	10.0	53.33	0.70
Kinic acid	18.6	99.20	1.29
Gum	3.5	18.66	0.24
Amylum	14.6	77.86	1.01
Mulin	28.0	149.33	1.95
Gummoin	99.0	528.00	6.89
Medullin	326.0	1738.66	22.65
Lignin (fibres)	350.0	2826.66	36.81
Cinchonia	9.1	48.53	0.63
Quinia	14.5	77.33	1.01
Potash	6.6	35.20	0.46
Lime	6.0	32.00	0.42
Magnesia	1.5	8.00	0.10
Hydrochloric acid	5.4	28.80	0.37
Silica	4.5	24.00	0.31
Moisture	42.0	228.26	2.92
Loss	86.9	463.40	—
	1440.0	7685.13	93.91

Pharm. Central Blatt, May 17, 1848.

RESEARCHES IN THE PRINCIPAL METALLIC POISONS, AND MODE OF ASCERTAINING THEIR PRESENCE.

Read at the Paris Academy of Sciences.

BY M. ABREU.

It often happens that persons called upon to make toxicological examinations of substances entrusted to their care, regret the absence of a positive and unique method to serve as a guide when they are entirely without any indication as to the direction which should be given to their research.

Indeed, the treatises on toxicology, which, in other respects afford so much valuable information on the research after poisons, often leave the reader in a state of the most serious embarrassment, in proposing to him for each poison various processes, differing very much in value, and of a very dissimilar kind.

Hence arises a grave inconvenience. The investigator who wishes to ascertain with accuracy the presence of a poison in the suspected matter under investigation, finds it necessary to make so many experiments before he can in any way arrive at the probable nature of the poison for which he is searching.

This void we here endeavoured to fill as far as concerns the principal metallic poisons, and to bring the medico-chemical operations to the point of a single problem of analytical chemistry : *One or more metals being given in the contents of an organic matter to determine their nature.*

To arrive at a solution of this important problem, we have passed successively in review the different well known methods which up to the present time have been proposed for the special research of each metal.

Struck with the distinctness of the results obtained in the research after antimony, by the process of M. Millon, which consists, as is well known, in destroying the organic matter by the combined action of hydrochloric acid and chlorate of potash, we have conceived the idea of drawing up the basis of a general method, and have arrived at a modification of this process in such a manner, as not only to extend it to the research after all the principal poisons, but still more completely to disembarrass us of the organic matter.

This method comprehends the compounds of the following metals :—

Arsenic	Mercury	Tin
	Copper	Zinc
Antimony	Lead	Silver

The operation will be as follows :—

Analysis of the solid matters found in the stomach, the matters vomited, and of the stools, the tissues of the gastro-intestinal canal, the liver, and other organs, or any other suspected solid matter, the blood, the urine, and other organic liquids, previously concentrated at a gentle heat.

The investigator should first attentively examine by the naked eye, or better still, by a glass, the substances passed in the vomits and the stools, the matters found in the digestive canal, and the mucous surface of the same canal. He may thus in some cases furnish himself with valuable indications, which will put him in the way of research, and it is possible, as is sometimes the case, that he may find in the digestive canal, and particularly in the folds of the mucous membrane, solid particles of the poisonous substance.

In this last case, he must carefully remove, by means of a small pencil, the particles of poison, and hasten to examine them by the ordinary methods ; but supposing that no important indication results from this physical examination, he must proceed as follows in the research of the poisons comprised in the above table :—

With very clean scissors dividing the suspected matter into very small portions, take a given weight, which should never be less than 200 grammes (about 7 ozs.), and introduce it into a glass flask, with one half its weight of pure and smoking hydrochloric acid. At the neck of the flask is to be adapted a cork, perforated with two holes, of which the one is destined to receive a tube of 55 to 60 centimetres (20 inches) in length and one centimetre ($\frac{3}{8}$ths of an inch) in interior diameter, dipping an inch in hydrochloric acid. From the other opening arises a tube bent back at a right angle, of which the second vertical branch plunges through a cork into distilled water contained in a receiver. The cork of this is furnished with

a second hole destined to receive a straight tube which will not plunge into water.

Things being thus arranged, the flask is placed on a sand-bath, and the receiver in cold water changed from time to time ; the sand-bath is maintained at a temperature near the boiling point of the liquid, without reaching that point, during at least four hours, agitating the contents of the flask from time to time.

The fragments of organic matter gradually dissolve in the hydrochloric acid, and at length form with it a dense, homogeneous, and more or less dark liquid. Remove the sand-bath, and place the flask on the naked fire, and boil the liquid during two or three minutes. This done, commence to introduce by little and little crystals of chlorate of potash by the larger tube (taking care to agitate the flask continually), until about 16 to 18 grammes have been added for each 100 grammes of the suspected matter under examination.

A vivid reaction and abundant disengagement of chlorine gas takes place ; the liquid gradually clears, and at last becomes completely limpid and of a yellow colour, the intensity of which, varying much in its shades of colour, appears to depend especially on the great excess of chlorine which remains in solution, and not only the liquid in the flask, but the water in the receiver exhibit in a high degree the characteristic odour of chlorine. Small fragments of carbonaceous matter and of a resinoid substance float on the surface of the liquid in the flask, which are less abundant in researches on the blood, and is very abundant when the operations are conducted on the liver and other parenchymatous organs.

Allow the apparatus to cool, filter the liquor in the flask and mix with the water in the receiver, and that which has served for several washings, the residuum which remains in the filter. Pass a current of well washed sulphuretted hydrogen through the liquid for some time, and allow it to remain until the next day in a closed bottle. In every case there will be formed a precipitate more or less abundant in which should be sought for all the metals comprised in our table, except silver and zinc. The precipitate may nevertheless contain only sulphur and a small quantity of organic matter, which may be got rid of in the following manner:—Throw the precipitate on a filter without folds, wash with distilled water, and put it into a small flask with its weight of pure and fuming hydrochloric acid; boil, and add a few crystals of chlorate of potash. When the reaction is over add a small quantity of distilled water, and apply heat with much precaution to drive off all the free chlorine. Filter again, and thus a limpid scarcely yellow-coloured liquid will be obtained. It is in this liquid that arsenic, antimony, mercury, copper, lead, and tin is to be found, if the suspected matter contain either of these substances. As to the zinc, as it is not precipitable by sulphuretted hydrogen from an acid liquor, this metal must be sought for in the liquid obtained by filtration after the action of sulphuretted hydrogen. As silver can only be found in an insoluble state, it must be sought for in the residue of the first filtration.

After having thus described our process, we pass to the examination of the most sensible methods for ascertaining the presence of the different metals contained in the above table, endeavouring to avoid all the causes of error which are likely to arise. In the liquid obtained in the last place, we search simultaneously for arsenic and antimony by means of Marsh's apparatus, as modified by the Academy of Sciences : we then pass to the research after mercury, copper, lead, and tin, in the liquid contained in the apparatus, after having dissolved in *aqua regia* all that is deposited at the bottom of the bottle. As for zinc and silver, the first must be sought for in the liquid obtained by filtration after treatment with sul-

phuretted hydrogen ; and the second in the residue of the first filtration. We have often operated on two milligrammes ($\frac{1}{38}$ of a grain) mixed with considerable quantities of animal matters.—(*Referred to a Commission composed of MM. Thenard, Dumas, Pelouze, Magendie*).

ESSENCE OF CAMPHOR.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—Believing that my formula for essence of camphor may be useful to some of the readers of your excellent Journal, I beg here to offer it for insertion, should it meet with your approbation. It will mix readily with water to a strength at least double that of the mist. camph. (Ph. Lond.) Take of tincture of camphor, Ph. Lond., a fluid ounce, proof spirit seven fluid ounces, mix. Half a fluid drachm will, when mixed with a fluid ounce and a half of water, make camphor mixture of the usual strength.

I have the honour to be, Sir,
Your obedient Servant,
Joseph Houlton.

London, 11*th Sept.*, 1848.

FOREIGN DRUGS.

An inquiry having recently been instituted as to the liability to duty of magnesia imported from abroad, it having been customary at one of the principal out-ports to levy the *ad valorem* duty of 10 per cent. thereon, in consequence of its having undergone various processes of calcining and mixing with other ingredients, and therefore no longer retaining the character of a simple drug, but as the article termed *calcined magnesia* is in public and general estimation considered to be a drug, and is, in fact, largely dealt in by all druggists, it has become matter for consideration whether it should not be admissible free under that general head in the tariff, as the table of duties does not define the description of drugs which shall be free from liability to duty, or otherwise, neither that they shall be merely essences, or not a combination of different materials, or shall not be in a prepared state, but simply enumerated as "drugs," without reference to their actual character or qualities. For these reasons, and on the principle that all articles which are applicable to, and intended for medicinal purposes, whether in their primitive state or having undergone a degree of manufacture, should be considered drugs, provided they are not actually and individually mentioned in the tariff as being liable to duty under any particular rate, it has been considered that such was the intention of the Legislature in repealing the duty on drugs, and that magnesia is such an article, and therefore admissible duty free. The question as to what constitutes a drug has frequently engaged the attention of the revenue authorities, when there was some doubt entertained whether articles which were not entirely, and only applicable to medicinal purposes, should be considered drugs, but no doubt existed as to those which were applicable to medicinal purposes being so classified. This decision, as it will govern future importations of the article, is of much interest and importance.—*Times.*

THE DISCOURAGEMENT OF BUSINESS ON SUNDAY.

TO THE MEMBERS OF THE PHARMACEUTICAL SOCIETY.

GENTLEMEN,—In the last number of the *Pharmaceutical Journal*, a "notice" was published in reference to partial closing on the Sabbath-day, emanating from a large number of Chemists in the eastern division of London, taking Shoreditch as a centre. The arrangement was entered upon the first Sunday in this month, and the result has been so highly satisfactory, I am induced to bring the facts forward for the consideration of others who may be willing to adopt reforms, having for their object an abridgment of the hours of business on the Sunday.

In the first place I have to observe, that there was a cordial and unhesitating unanimity in the undertaking—a willing promptitude in the performance of it, and the plan has so far worked admirably. The public has been satisfied, and our personal comforts and privileges exceedingly enhanced, without any sacrifice of our pecuniary interest.

With reference to the public necessities, I can say for myself and others around me, that we have given the same amount of accommodation in seven hours less time. This is satisfactorily proved by the returns of the day, which is a complete answer to the question of interest.

It will probably be contended by some that this is only a half measure, and that we ought to have taken higher ground, disregarding entirely pounds, shillings, and pence. I am here reminded of the attempt in the year 1839. I was one of a Committee appointed at a general meeting at the Crown and Anchor Tavern, present most of the leading members of the trade, having for its object the entire closing on the Sabbath, and answering no applications but those of real necessity. This so zealously advocated and laudably begun, was very coolly received and indifferently carried out by the general body of the trade. The consequence was, that most of those who were really well disposed to the measure, fell back upon the old system one after another, leaving but a very few faithful to the undertaking, who, to their honour be it said, are still acting up to the principle, though I must admit in justice to others residing in less favourable localities, the object was much easier carried out, both as regards interest and necessity, than in those neighbourhoods where a large number of working people are located. The dose of salts to the poor man in Spitalfields, is as much within the limit of necessity, as the prescription of Sir Benjamin Brodie is to a patient in Park Lane. In short, it was found impossible to draw the line of necessity, and thus, by undertaking too much, little was accomplished.

In the object now brought before you, as adopted without exception in one whole district, much good is realized, by adding to the respectability of our business, and the comfort of our homes, saying nothing of the opportunity it offers for enjoying the greatest privilege a Christian man can desire, while it is no impediment to any one who may wish to effect more. We adopt and pledge ourselves to this as the *minimum*, leaving it open to individuals to carry it out as much farther as their own inclinations may prompt—as regards the public, I can affirm this movement has been well received and justly appreciated.

In submitting these facts, I beg leave to refer you to the "notice" published in the last number of this Journal, and

I am, GENTLEMEN,

Your very humble Servant,

174, *Shoreditch, Sept*, 18, 1848. J. BEATON.

We have received from Mr. Mason the following from Hastings :—

"NOTICE.—The Public are respectfully informed that the undersigned Druggists purpose entirely closing their Shops on the Sunday (except

for the Dispensing of Medicine, when attendance will always be given), commencing on Sunday, October 1st.

Amoore, C., Castle Street; Hatton, T. J., All Saints Street; Lea, H. C., 66, High Street; Mason, W., 58½, High Street; Norwood, J., Pelham Place; Pitman, H., Creek; Stubbs, E. W., George Street."

September 22d, 1848.

[Mr. Griffith of Clerkenwell Green, informs us that the Chemists in his locality are generally disposed to adopt the practice of closing their shops betwcen the hours of eleven and six, it being understood that in cases of absolute necessity, medicines may be had at all times. In carrying out this intention, we would suggest the propriety of each individual acting for himself on principle, and not relaxing in the resolution on account of the course adopted by others. If the practice be adopted in this spirit, we think advantage will result from it, and no inconvenience to the public. We can state from experience that it is not necessary to take down a shutter on Sunday.—Ed.]

BOOKS RECEIVED.

Works of the Cavendish Society.—Chemical Reports and Memoirs *on Atomic Volume—Isomorphism—Endosmosis—The simultaneous Contrast of Colours—The latent Heat of Steam at different Pressures—The artificial Formation of Alkaloids—and Volcanic Phenomena.* Edited by Thomas Graham, V.P.R.S., &c. &c. London: Printed for the Cavendish Society by T. R. Harrison, St. Martin's Lane. 8vo, pp. 370.

A Synopsis of the Diseases of the Human Ear. By William Harvey, M.R.C.S., &c.

OBITUARY.

On Saturday, the 16th of September, at Brighton, aged 49, Charles Speare Tosswill, of Torrington Place, London.

Mr. Tosswill was a member of the Council of the Pharmaceutical Society, and took an especial interest in the Benevolent Fund. On the 16th of May (the day of the last Anniversary Meeting of the Pharmaceutical Society) he was attacked with paralysis, from which he never recovered. He had been for some years complaining occasionally of delicate health, having, as he supposed, some organic affection of the heart.

He was greatly respected by all his friends and neighbours. His remains were interred at Kensall Green, on Wednesday, the 20th of September.

TO CORRESPONDENTS.

The Medical Page.—We have received the following from Mr. Pasmore, in reference to an advertisement for a medical page and dispenser, quoted in our last number:—

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—On perusing the Journal for the present month, I find an Advertisement purporting to be extracted from the *Times* of the 29th of July last, in which I am referred to by the Advertiser for particulars. Now, how I became the party referred to, was this: a customer, a medical man, asked permission to have letters in reply to an advertisement, addressed to my house; a request to which of course I could not otherwise than consent, but of the subject of which I was perfectly ignorant until I read the same in the Journal. This being my only connexion with the "would be" generous

medical practitioner or his singular advertisement, I hope you will do me the favour to insert it in your next number.

I am, Sir, yours respectfully,

3, *Colville Terrace, King's Road,* JAMES PASMORE.
September 15*th*, 1848.

Supposed Test for Cod Liver Oil.—Mr. Hockin, of Duke Street, Manchester Square, has sent us the following as a test for cod-liver oil: "Mixing together on a porcelain slab four parts of genuine cod-liver oil and one part of strong sulphuric acid, and stirring with a glass rod, a beautiful and rich violet colour, similar to the fumes of iodine is produced, which in a few instants passes gradually to a dirty brown, the altered portions of the oil separating in irregularly shaped patches from that out of reach of the acid. This remarkable characteristic is not possessed by either olive, almond, whale, or fine sperm oils, nor do I believe by any other fat oil. The reaction varies the appearance from a delicate fawn to a dark caromel. The latter is produced with several samples of very light cod-liver oil which are found in the market, a circumstance that induces me to think they have been bleached with chromic acid or other powerfully deoxidizing agent, thus decomposing all the gelatinous principle so abundant in genuine cod-liver oil." —[This test will merely indicate the presence of cod-liver oil, but does not afford the means of ascertaining whether other oils be mixed with it or not. We tried it more than twelve months ago, with mixed oils in various proportions, and the result was so equivocal, that we concluded not to publish it as a test under the idea that it was calculated to mislead, except in the extreme case of no cod-liver oil being present. It also gives no indication of the quality of the oil, as some of the worst samples, not fit for sale, exhibited the purple appearance as decidedly as the best genuine oil.]

E. P. F.—In reply to a correspondent (*Iodinum*) of last month, refers to a formula for Tincture of Iodide of Iron in Beasley's *Formulary*, 4th edit., page 373.—[The formula alluded to is not recognised by any Pharmacopœia or other authority, but is the formula of an individual. In vol. vii., p. 357, we suggested some precautions in reference to the adoption of formulæ. We may add that the above tincture does not answer the description required by "Iodinum," who wanted a preparation not liable to decomposition by keeping.]

A. P. S. (*Manchester*).—Dr. Clark's Test for the Hardness of Water, is described in his pamphlet, which is published by Taylor, Red Lion Court, also see *Pharm. Journ.*, vol. i, pp. 156 and 216, also vol. vi, p. 526.

F. G.—There is no authorized formula for the preparation of *Citrate of Iron and Quinine*, and that made by different manufacturers differs considerably in appearance and also in composition. It ought to be entirely soluble in water, yet, after being kept for some time, it is often found that on adding it to water there is a white flocculent insoluble residue left, which consists of part of the quinine. The specimen sent is in this state.

T. M.—The addition of potash to arsenic forms a compound soluble in cold water.

W.—The word *caoutchouc* is generally pronounced as it is spelt.

T. C. R. inquires what substances are alluded to when poisons are advertised for killing vermin, but described as being "totally devoid of danger to human life and also to dogs and cats," and whether the statement be correct or not? [The phosphorus paste answers this description, for although it might be injurious if swallowed, it is not likely to be taken by mistake.—Nux Vomica may be considered a "safe poison" when compared to arsenic, because the bitter taste is a security against accidents.]

"*Veritas.*"—Proof impressions of the diploma are reserved for those Associates who were Founders.

"*Juvenis.*"—*Lindley's School Botany*, price 5*s.*

P. G.—Spoonfuls.

W. B.—The analysis of the five specimens would occupy more time than we could spare.

A. P. S.—The strength of solution of tannin for the teeth is arbitrary, or dependent on the circumstances of the case. About a drachm to eight ounces would be an average strength.

J. C., A. P. S.—Mr. Redwood's work on Practical Pharmacy is nearly ready for publication, and will probably appear in the course of the present month. It will contain much of the matter comprised in that part of the author's lectures which treats of Practical Pharmacy.

D.H.P.—In washing the blue precipitate, formed in the process for making blue ink, according to Mr. Reade's patent, a description of which was published in this Journal, vol. vii., p. 182, it should be placed in a filter and water poured over it in small quantities at a time, until the water which passes through assumes a blue colour. The precipitate is not soluble in water containing the soluble salt originally present in solution, but in pure water it is soluble. When, therefore, it begins to dissolve in the washing-water, it may be inferred that it has been sufficiently purified from other salts, and that it may now be dissolved by rubbing it in a mortar with pure water.

"*Chemicus.*"—The marking-ink alluded to does not undergo the change described if properly prepared. Mr. Reade's directions are not, however, sufficiently explicit. A more complete formula will be found in vol. vi., page 419.

A. F. S.—Marrow-oil may be obtained from marrow by expression.

A. H. W. has sent us a copy of a circular lately issued by a Grocer-Druggist, who "has up to *within the last six months been working in the cutlery business* in Sheffield, but has now taken to himself all the insignia of a dispensing Chemist, show-bottles, &c., complete." Every instance of this description furnishes additional evidence of the necessity of an Act of Parliament to regulate the education of Chemists and Druggists.

The Medicine Stamp Act.—*T. B. S.* (*Leeds*) informs us that the informers are on the look out on behalf of the Commissioners of Stamps. These parties are not "common informers," but persons engaged by the authorities at Somerset House for the purpose of detecting evasions of the duty, and enforcing the penalties.

We have received the *Hull Packet and East Riding Times*, containing Mr. Wynn's letter on the Excreta of Towns.

We have also received a Prospectus of the Liverpool School of Practical Chemistry, recently established under the superintendence of Dr. James Sheridan Muspratt, late Assistant-Professor at the Royal College of Chemistry, London. The design of this School is similar to that of Liebig's at Giessen, and the College of Chemistry, London, with which latter institution Dr. Muspratt looks forward to establishing a union. Without offering an opinion as to the policy of this proposed amalgamation, we may congratulate our brethren and others interested in the science of Chemistry at Liverpool, on the facilities which the new institution will afford for prosecuting the study.

Advertisements to Mr. Churchill, Princes Street, Soho.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the Editor, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. V.—NOVEMBER 1st, 1848.

THE CHOLERA.

We have seldom had a more difficult task to perform than that of giving a condensed account of what has been done, and is in progress, in regard to the dreaded approach of this formidable malady. The subject has been one of the most prominent before the public during the past month, a general alarm prevails, and every one is naturally inquiring what is the best course to be adopted by way of prevention and cure. The Government has not been inactive, either in the appointment of guardians of the public health, or in the publication of orders and instructions. There is one omission, however, which is to be regretted. The question is essentially a medical one, and it is one which demands a careful and complete investigation by the profession at large, in order to collect and compare evidence, and thus to arrive at some degree of unanimity on the subject. It might, therefore, have been expected that the first step would have been to consult the medical profession in the most complete and official manner. To the College of Physicians, as the representatives of the profession, application might have been made in such a case, and a report emanating from that body, either by itself or in conjunction with other branches of the profession, would have had some weight as a medical document. The doubts which exist as to the nature of the disorder and the course of treatment to be pursued, furnish a strong argument in favour of a medical conference, by means of which some light might be thrown on the question. The Government, however, has taken a different course. We have not heard of any official communication being made to the College of Physicians, but the *onus* devolves, in the first instance, on the Commissioners of Sewers (aided by a few isolated medical opinions) who issue a series of instructions chiefly relating to the removal of nuisances, and dietetic regulations (*See* vol. viii. No. 2.) Then a

BOARD OF HEALTH

is appointed, from the constitution of which it might be supposed that the cholera is to be expelled from the country by law ;—physic being thrown to the dogs.

If it were proposed to institute an inquiry into the state of the law with a view of relieving the public from the danger of imposition, and if for this purpose a committee of Physicians

It was thought necessary, in anticipation of a mysterious and fatal epidemic, to institute an inquiry with a view of protecting the public from the danger of infection, and for this

were to be appointed, under the title of a Legal Board, some persons might call in question the rationality of the proceeding. Others might argue that the Physicians, although unacquainted with law themselves, might obtain information from others more conversant with the subject.

In case of need a Legal Practitioner might be added as a supplementary appendage, to be consulted occasionally.

The Lawyers might probably be dissatisfied with such an arrangement, and they might be told, that as they had not taken the initiative by introducing the needful reforms into their profession, it had been found expedient to call in the doctors.

purpose a committee of Legislators has been appointed under the title of a Board of Health. These gentlemen have had no medical education, but they may obtain information from others more conversant with the subject. In case of need a Medical Practitioner, Dr. Southwood Smith, has been appointed as an appendage to the Board, to be consulted occasionally.

The Physicians are probably dissatisfied with this arrangement; but they may be told, that as the College did not take the initiative by appointing a Committee of inquiry into this important medical subject, it has been found expedient to call in the lawyers.

The Board of Health consists of Lord Morpeth (now the Earl of Carlisle) Lord Ashley, and Mr. Chadwick. As philanthropists, and zealous labourers in useful objects, it would be difficult perhaps impossible, to select two men more entitled to the thanks of the public than Lord Morpeth and Lord Ashley. Mr. Chadwick also has distinguished himself by his indefatigable exertions in the reform of the Poor-laws; and although the result of his labours may not have given universal satisfaction, the fact that he has rooted up many nests of corruption cannot be questioned. He is indeed compared by some persons to the cuckoo, a bird which drives other birds out of their nests, and by this means obtains one for himself. In one respect, however, the analogy is not complete, for the cuckoo takes the nest as he finds it, Mr. Chadwick remodels and enlarges it.

REMEDIES AND PRUDENTIAL MEASURES RECOMMENDED BY THE BOARD OF HEALTH.

The Board of Health has commenced its medical labours with much diligence, and has issued some important general instructions respecting the means of prevention and treatment to be adopted for mitigating the fatal results of the Cholera, from which we give the following extracts. We confine ourselves chiefly to the remedial portion of the instructions, omitting the details of

regulations for improved ventilation, drainage, and the removal of dunghills and other nuisances likely to favour the spread of miasma.

The notification of Oct. 8th commences with the statement, that Medical Practitioners of eminence and special knowledge on the subject have been consulted, the tenor of whose observations is collected for the information of the public.

"The extent, uniform tenor, and undoubted authority of the evidence obtained from observers of all classes in different countries and climates, and amidst all varieties of the physical, political, and social conditions of the people, appear to discredit the once prevalent opinion that cholera is, in itself, contagious; an opinion which, if fallacious, must be mischievous, since it diverts attention from the true source of danger and the real means of protection, and fixes it on those which are imaginary; creates panic; leads to the neglect and abandonment of the sick; occasions great expense for what is worse than useless; and withdraws attention from that brief but important interval between the commencement and the development of the disease, during which remedial measures are most effective in its cure."

In the face of this official declaration we read the following in *The Times* of Oct. 17:—

"On the 5th instant all the Commissioners of Customs received instructions from the Privy Council to keep out the cholera. They were to do so by stopping every vessel from a cholera port, that is, from a port where there had been deaths from cholera, and detain the said vessel till it had been six days from port. In case of a death on board, there was to be another six days' detention. Hamburgh, for example, is a cholera port, two days from our shores. There are steamers between Hamburgh and London and Hamburgh and Hull. On arriving in the Thames or the Humber, the passengers have to perform quarantine for four days, after which they cease to be mad dogs, and are allowed to walk the streets of London or Hull, and take their seats in the railways. Such are the orders for the living. The dead are provided for with equal care. They must be carried out to deep sea, double shotted, and sunk, with every possible precaution against their re-appearance in the realms of day.

* * * *

"The world will naturally inquire the reason of this ridiculous proceeding. Is it founded on public opinion? The public are unanimous against it. Has the Board of Health recommended it? The Board of Health has not been consulted in the matter; nay, more, it has been positively set at nought. A Board of Health has been created to be neglected. It has declared against the contagious theory. The Privy Council, however, takes that theory for granted."*

Dr. Hawthorne, of Liverpool, in a very practical pamphlet just published, observes,

"Quarantine restrictions never retarded the entrance of cholera into any country for a single hour. They never did good, but always a great deal of mischief. They embarrassed commerce, and injuriously excited the fears and cramped the industry of the people. It will be a great bless-

* Since the above was in type the order of the Privy Council has been repealed, no quarantine laws being now in force in reference to cholera.

ing to the community, in case of another invasion of the disease, if the alarm of the people be not increased, and all the concomitant evils aggravated, by any unnecessary and useless precautions."

The Board of Health proceeds—

"The guardians of the poor and the parochial boards will probably be required, either by themselves individually, or by persons to be employed or specially appointed by them for the purpose, to make examinations from house to house of their several districts, and report to their boards upon the state of each locality, as far as regards the prevalent sickness and the removable causes upon which it may appear to depend. These visitations from house to house will be especially required in the dangerous districts; and it is to be kept in view that every district or place is dangerous in which typhus and other epidemic diseases have regularly occurred.

"The boards of guardians and parochial boards will have to put in force, whenever it may appear to be required, those provisions of the act that relate to nuisances.

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"The chief predisposing causes of every epidemic, and especially of cholera, are damp, moisture, filth, animal and vegetable matters in a state of decomposition, and, in general, whatever produces atmospheric impurity, all of which have the effect of lowering the health and vigour of the system, and of increasing the susceptibility to disease, particularly among the young, the aged, and the feeble.

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"Next to the perfect cleansing of the premises, dryness ought to be carefully promoted, which will of course require the keeping up of sufficient fires, particularly in the damp and unhealthy districts, where this means should be resorted to for the sake of ventilation as well as of warmth and dryness.

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"By the recent act (11th and 12th Victoria, chap. 123, sec. 1) in cases of inability, insufficiency, or neglect, the law has charged the cleansing operations upon certain public bodies—namely, 'the town councils, or any trustees or commissioners for the drainage, paving, lighting or cleansing, or managing or directing the police, or any other body of a like nature, or any commissioners of sewers, or guardians of the poor.'

"By this act it is provided, that upon notice in writing, signed by two or more inhabitant householders, that any dwelling-house or building is in a filthy and unwholesome condition, or that there are upon such premises any foul and offensive cesspool, drain, gutter, or ditch, or any accumulations of filth, or that swine are so kept as to be a nuisance or injurious to health, the authorities shall examine, or cause the premises to be examined; and, if upon examination, or upon a medical certificate of two legally qualified practitioners, it appears that the nuisance exists, the public authority shall make complaint before two justices, who are required to make an order for the removal of such nuisance. The amended provisions contained in this act should be early considered, promulgated, and enforced, especially those for the proper cleansing of open and foul ditches near habitations, by the labourers under the direction of surveyors or trustees of highways.

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"If, notwithstanding every precautionary measure which can be taken, this disease should unhappily break out in any district, then it will be essential to the safety of the inhabitants that they should be fully impressed with the importance of paying instant attention to the premonitory symptom that announces the commencement of the attack.

"This premonitory symptom is looseness of the bowels, which there is

reason to regard as universally preceding the setting in of the more dangerous stage of the disease. Sometimes, indeed, under the circumstances already described—namely, where the poison exists in unusual intensity, or the constitutional predisposition is unusually great, the first stage may appear to be suppressed, as occasionally happens in violent attacks of other diseases ; but in cholera this event is so rare as to be practically of no account ; and in all countries, and under all varieties of conditions in which this disease has been epidemic, the experience as to this point uniformly agrees with what is observed at the present moment at Hamburgh.

* * * * * *

" This looseness of the bowels may be accompanied with some degree of pain, which however is generally slight ; but in many cases pain is wholly absent ; and for some hours, and even days, this bowel complaint may be so slight as to appear trifling ; so that, without a previous knowledge of the importance of the warning, it might easily escape notice altogether.

" It must be repeated, however, that whenever Asiatic cholera is epidemic, the slightest degree of looseness of the bowels ought to be regarded and treated as the commencement of the disease, which at this stage is capable of being arrested by simple means, but, if neglected only for a few hours, may suddenly assume a fatal form.

" It will be indispensable, therefore, on the first outbreak of cholera that the local authorities should immediately make arrangements for daily house to house inspections of the poorer localities in their respective districts ; this being the only practical means by which, in the most dangerous situations and among the most susceptible subjects, the existence of the premonitory symptom can be ascertained in time to administer the proper remedies so as to arrest the progress of the disorder.

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" Each member of the visiting committee should be provided with proper remedies, prepared in appropriate doses for administration on the spot, in every instance in which the premonitory symptom is found to exist, and should report every person so treated as requiring the instant attention of the medical officer.

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" It will be necessary to engage a sufficient number of medical officers at suitable remuneration, some to devote their whole time by day and night to the service of the dispensaries, and others to attend the sick at their own dwellings.

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" Medical authorities are agreed that the remedies proper for the premonitory symptom are the same as those found efficacious in common diarrhœa ; that the most simple remedies will suffice if given on the first manifestation of this symptom ; and that the following, which are within the reach and management of every one, may be regarded as among the most useful, namely, 20 grains of opiate confection, mixed with two tablespoonsful of peppermint-water, or with a little weak brandy and water, and repeated every three or four hours, or oftener if the attack is severe, until the looseness of the bowels is stopped ; or an ounce of the compound chalk mixture, with 10 or 15 grains of the aromatic confection and from 5 to 10 drops of laudanum, repeated in the same manner. From half a drachm to a drachm of tincture of catechu may be added to this last if the attack is severe.

" Half these quantities should be given to young persons under fifteen, and still smaller doses to infants."

As Chemists are constantly applied to for these remedies, a caution respecting the opium is requisite. It is well known by Medical Practitioners that very minute doses of opium are sometimes

fatal to infants. Mr. Taylor, in his work on Poisons, cites several cases in which infants have been poisoned by two or three drops of laudanum. According to the instructions of the Board of Health, which are intended for the guidance of the public at large, half a dose is to be given "to young persons under the age of fifteen" (that is, ten grains of confection of opium, equal to one-fourth of a grain of opium), "and still smaller doses to infants." The dose given to an infant might be within these limits, and yet it might exceed the quantity which has been known to prove fatal; and an infant having simply a slight disorder of the bowels, supposed to be cholera, might be poisoned before the arrival of the medical attendant. We, therefore, suggest that opium should never be given to infants, except by order of medical practitioners.

"It is recommended to repeat these remedies night and morning for some days after the looseness of the bowels has been stopped. But, in all cases, it is desirable, whenever practicable, that even in this earliest stage of the disorder recourse should be had to medical advice on the spot.

"Next in importance to the immediate employment of such remedies, is attention to proper diet and clothing. Whenever Asiatic cholera is epidemic, there is invariably found among great numbers of the inhabitants, an extraordinary tendency to irritation of the bowels; and this fact suggests that every article of food which is known to favour a relaxed state of the bowels, should, as far as possible, be avoided—such as every variety of green vegetables, whether cooked or not, as cabbage, cucumber, and salad. It will be important also, to abstain from fruit of all kinds, though ripe and even cooked, and whether dried or preserved. The most wholesome articles of vegetable diet, are—well baked but not new bread, rice, oatmeal, and good potatoes. Pickles should be avoided. Articles of food and drink, which, in ordinary seasons are generally wholesome, and agree well with the individual constitution, may, under this unusual condition, prove highly dangerous. The diet should be solid rather than fluid, and those who have the means of choosing, should live principally on animal food, as affording the most concentrated and invigorating diet; avoiding salted and smoked meats, pork, salted and shell-fish, cider, perry, ginger beer, lemonade, acid liquors of all descriptions, and ardent spirits. Great moderation, both in food and drink, is absolutely essential to safety during the whole duration of the epidemic period. One single act of indiscretion, has, in many instances, been followed by a speedy and fatal attack. The intervals between the meals should not be long, cholera being uniformly found to prevail with extraordinary intensity among the classes that observe the protracted fasts common in eastern and some European countries.

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"On account of the intimate connexion between the external skin and the internal lining membrane of the bowels, warm clothing is of great importance. The wearing of flannel next the skin is therefore advisable.

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"It may be necessary to add a caution against the use of cold purgative medicines, such as salts, particularly Glauber salts, Epsom salts, and seidlitz powders, which, taken in any quantity in such a season, are dangerous. Drastic purgatives of all kinds should be avoided, such as senna, colocynth, and aloes, except under special medical direction.

"If, notwithstanding these precautionary measures, a person is seized

suddenly with cold, giddiness, nausea, vomiting, and cramps, under circumstances in which instant medical assistance cannot be procured, the concurrent testimony of the most experienced medical authority shows that the proper course is, to get as soon as possible into a warm bed; to apply warmth by means of heated flannel, or bottles filled with hot water, or bags of heated camomile flowers, sand, bran, or salt, to the feet and along the spine; to have the extremities diligently rubbed; to apply a large poultice of mustard and vinegar over the region of the stomach, keeping it on fifteen or twenty minutes; and to take every half hour a tea-spoonful of sal volatile in a little hot water, or a dessert spoonful of brandy in a little hot water, or a wine glass of hot wine whey, made by pouring a wine glass of sherry into a tumbler of hot milk—in a word, to do everything practicable to procure a warm, general perspiration until the arrival of the medical attendant, whose immediate care under such circumstances is indispensable.

"It has not been deemed necessary or proper to give instructions for the treatment of the advanced stage, from the confident expectation that the proposed arrangements will supply medical attendance for all cases that may reach that condition, by which means the specific symptoms of each individual case will receive their appropriate treatment.

"Though the season of danger may demand some extraordinary exertion and sacrifice on the part of all classes, yet this period will probably not be protracted, since on the former visitation of cholera it seldom remained in any place which it attacked longer than a few months, and rarely more than a few weeks; while it may be reasonably expected that the improvements effected with a view to check its progress will be equally efficacious in shortening its duration; and that these improvements will not be temporary like the occasion that called for them, but will be attended with lasting benefit.

"In conclusion, the General Board of Health would again urge the consideration, that whatever is preventive of cholera is equally preventive of typhus and of every other epidemic and constantly recurring disease; and would earnestly call the attention of all classes to the striking and consoling fact, that, formidable as this malady is in its intense form and developed stage, there is no disease against which it is in our power to take such effectual precaution, both as collective communities and private individuals, by vigilant attention to it in its first or premonitory stage, and by the removal of those agencies which are known to promote the spread of all epidemic diseases. Though, therefore, the issues of events are not in our hands, there is ground for hope and even confidence in the sustained and resolute employment of the means of protection which experience and science have now placed within our reach."

SUGGESTIONS FROM THE MEDICAL GAZETTE.

In the *Medical Gazette* we find the following suggestions, as to the manner in which pocket medicine boxes should be provided, for the convenience of medical men in dispensary or hospital practice:

"POWDERS.—*Carbonate of Ammonia*, in waxed papers, each paper containing 40 grains, with the following printed directions on the outside:—'Dissolve this powder in half a pint of water, give two table-spoonfuls every hour.'

"POWDERS.—*Compound powder of Chalk with Opium* (*Pulv. Cretæ. c. Opio*), in packets, each containing 6 papers, each paper containing 10 grains of the powder, with printed directions:—'One powder every half-hour until the looseness ceases."

"PILLS *of Powdered Opium*, each containing one quarter of a grain of

Opium, and two grains of Powdered Ginger, made up with Oil of Peppermint. The Pills to be in boxes, each box containing 6 Pills, with a printed label :—' Opium Pills, one every half-hour until the looseness ceases.'

" Pills *of Mercury and Opium*, each containing one quarter of a grain of Calomel, two grains of Hydrargyrum c. Cretâ (Mercury with Chalk), and a quarter of a grain of Opium, made up with *Oil of Caraway* (which will serve to distinguish them from the plain Opium Pills), in boxes, each containing 6 Pills, with a printed label :—' Mercury and Opium Pills, one every half-hour.'

" Bottles (one or two ounce phials, with *cork* stoppers),

1. Containing—Tincture of Opium (Laudanum).
2. " Hoffman's Liquor.
3. " Tincture of Rhatany.
4. " Creosote.

Along with the box should be carried a small jar of strong brown mustard."

CONFLICTING OPINIONS RESPECTING THE CHOLERA.

Considerable excitement being occasioned on the subject of cholera by the various official documents, reports, pamphlets, and advertisements daily appearing, the Chemists are, as might be expected, continually applied to not only for the remedies recommended, but also for advice as to which of the numerous forms or prescriptions are most proper. It is to be regretted that the medical profession has not removed this responsibility from our body by arriving at a more unanimous opinion on the subject. While some authorities adhere to the system of recommending calomel in rather large doses, others deprecate mercurials altogether. The Board of Health has adopted the latter doctrine. This appears to have been confirmed by many medical men who have written on the subject. Among others we may advert to Dr. Hawthorne, whose pamphlet we quoted above,* whose success at Dungannon, Belfast, &c., as shown by his statement and confirmed by several strong testimonials, is extraordinary. At Dungannon out of 340 cases treated, only sixty were fatal ; at Newtownlemavady no deaths occurred after his arrival. As facts of this description are important, we quote a few passages giving a general account of the remedies—

" These remedies I would briefly state to be—The Horizontal Posture of the Body—Opium—Cordial Stimulants—Perspiration,—the latter to be produced by the application of external heat, and to be continued by the same means, while mild, warm diluting drink is to be freely administered, to furnish an abundant supply of suitable fluid to the absorbent vessels which have been first excited to vigorous action by the perspiration."

With regard to opium, Dr. Hawthorne observes (page 27)—

" I prescribe doses of opium in cholera, not merely from the excessive vas-

* *The Pathological Nature of Cholera, and an Infallible Method of Treating it, with an Introduction, Additions, and Emendations*, by George Stuart Hawthorne, M.B., pp. 64. London : Simpkin, Marshall and Co., and John Churchill. Liverpool : Smith, Rogerson and Son.

cular depletion that accompanies the disease, but also from the great nervous depression which is always present. * * Two grains of opium would produce a greater effect on the nervous system in the ordinary state of the vessels, than even ten grains where the vascular depletion has been such as to endanger life. * * I have had occasion to give ten grains for a first dose."

"CORDIAL STIMULANT.—Upon their mode of operation I shall here observe very briefly. I shall enter more into detail afterwards in prescribing how they are to be used. Amongst the most useful of the stimulants we possess, are camphor, chloric ether, aromatic spirit of ammonia, and alcohol in the form of whisky or brandy. Such stimulants assist the opium in restoring and supporting the tone and energy of the nervous system. By their cordial effects, they strengthen the stomach and enable it to absorb the opium; and by their stimulating effect on the brain, they sustain it until the opium becomes absorbed, and exerts its more permanent remedial effect on the system."

The following formulæ are given under the title of Antispasmodic Pills and Antispasmodic Mixture:—

"Powdered opium, twelve grains.
Camphor, half a drachm.
Capsicum, nine grains.
Spirits of wine and conserve of rose, of each
a sufficient quantity—mix.
To be made into a mass and divided into twelve pills.

"Each of these pills, it will be observed, contains one grain of powdered opium.

"Chloric ether.
Aromatic spirit of ammonia.
Camphorated spirits.
Tincture of opium.
Of each one drachm.
Cinnamon water, two ounces—mix.

"As I shall have occasion frequently to refer to those pills and this mixture, I shall term them, for convenience and accuracy of reference, antispasmodic pills and antispasmodic mixture."

"Should the patient on the second day, as often happens after a malignant attack of the disease, complain of acidity of stomach with confined bowels, he should get two tablespoonfuls of the following mixture every third hour till relieved:—

"Sweet Spirit of Nitre
Tincture of Rhubarb } of each half an ounce.
Tincture of Colombo
Compound Tincture of Cardamons, three drachms.
Bicarbonate of Soda, two drachms.
Camphorated Julep, eight ounces.—Mix."

It would be foreign to our purpose, even if our space admitted of it, to give in detail the theory and method of treatment. It is our province merely to notice the remedies with as much explanation as may be required to make the statement intelligible. We must, however, quote a few words on two of the remedies, at one time considered essential, and still strongly recommended by some practitioners, namely, blood-letting and calomel—

"Blood-letting should be at once discarded from the treatment of the disease."

"All the symptoms at which any man could grasp, in justifying the use of the lancet in the early stages of Cholera, can be at once relieved by a free perspiration."

"Calomel, like blood-letting, tends only to hasten the fatal termination in Cholera. It does more. Those who escape or recover, in spite of the effects of it, do so at the expense of a ruined constitution. The reasons which are given by medical writers for using it in that disease are absurd, and are founded on a total misconception of its nature."

It would be impossible in our limited space, to give even a summary, however brief, of the numerous documents and pamphlets which have been issued on this subject, and it might be said by some persons, that the question being a medical one, is out of our province. Unfortunately the question hangs between two professions, Law and Physic, and in the emergency, what are the Chemists to do? Are they to refuse to furnish medicines when applied to, or are they to cull from the best sources within their reach such information as may enable them to meet the imperative demand of the public?

It is stated in the *Lancet* of October 21, that the College of Physicians has objected to some of the instructions issued by the Board of Health, and we have been anxiously looking out for an official announcement on this subject, but up to the time of going to press, none has appeared.

THE DRUGGIST'S DILEMMA.

According to the *Times* (of Oct. 20th), "the sale of the more active and concentrated drugs should be forbidden, save under medical authority." The Legislature is held up to censure for "calmly looking on," while the assassin or despairing man "need but to cross his threshold, and be invited to the shops where for a few pence he can purchase DEATH for himself or others."

"A smirking boy takes down the jar from the shelf, and pours its contents into the little phial: he covers the cork with red paper clipped with due precision, and neatly labels it as POISON"—as "though the dis-

According to the instructions issued by the Board of Health, the public are to provide themselves with certain remedies in anticipation of the cholera. Among these remedies, one of the most important, if not the most essential, is opium, in the form of confection or laudanum. To supply these, among other remedies, is one of the ordinary functions of the Chemist and Druggist.

These instructions are not confined to any particular class. The rich and the poor, the educated and the illiterate, the honest man and the knave, all are alike liable to an attack of this formidable malady, and all

tribution of poison were but one of the ordinary functions of his craft."

"Few Druggists, probably few Druggist's apprentices, would vend a poisonous drug to a man who rushed into the shop with disturbed look and haggard eye. This, however, is a defence too slight and insufficient for the community." The evidence of Mr. Samuel Birch, of the London Hospital, is quoted, to show "the mischievous manner in which poisons of almost every description are constantly sold over the counters of Druggists."

"While the sale of poison is legal, there can be no difficulty in hatching up a pretext by which it can be obtained."

are equally entitled to derive the benefit of the remedies or precautions which are recommended for the public at large.

Few Druggists, probably few Druggist's apprentices, would refuse to vend the usual remedies to a man who rushed into the shop with disturbed look and haggard eye, in dread of the fearful epidemic, and eager to provide the best means of escape, with as little delay as possible. These means of escape being prescribed according to law by a legal Board of Health, cannot be considered otherwise than orthodox.

While the sale of medicine is legal, it would be difficult to hatch up a pretext by which it could be refused.

By comparing the above parallel passages, it will be seen that those who undertake to lay down the law on matters with which they are not conversant, are liable to create perplexity where they intend to remove danger. A legal Board of Health directs the public to be provided with certain remedies. A non-medical editor denounces those who supply those remedies. Even a medical man brings a case of attempted suicide before the magistrate for the express purpose of pointing out the danger to which the public is exposed from the free trade in the articles recommended for general use by the Board of Health. Every one must admit that it is desirable to prevent accidents by poisoning, and for this purpose great care should be taken to label every poisonous substance in a proper manner, and to avoid selling them under circumstances which afford just ground of suspicion; but if it be proposed to prohibit the sale of poisons in general (which constitute a large proportion of the materia medica) for the sole purpose of preventing suicide or murder, then on the same grounds the sale of ropes, knives, razors, and all other articles capable of causing death should be prohibited.

THE MEDICINE STAMP ACT.

SEVERAL correspondents have made inquiries respecting some of the articles enumerated in the schedule to the Medicine Stamp Act, quoted in our last number. Although an allusion to this schedule is included in the general instructions to officers, there are some portions of it which are practically obsolete. Many of the medicines quoted are only known as matters of history, others have been exempted by subsequent provisions, and in other cases the Commissioners exercise a discretionary power.

Eau de Cologne and arquebusade waters are exempted by a Treasury order (the date of which we have not been able to ascertain) on the ground that these articles pay a sufficient amount of duty as spirits.

Some lozenges are exempted by 55th Geo. III., cap. 184, sec. 54, as follows :—

"Provided always, and be it further enacted, That nothing contained in this or any other Act shall extend, or be construed to extend to charge with any stamp, ginger and peppermint lozenges, or any other article of confectionery, unless the person vending the same shall vend the same as medicines, or as beneficial for the prevention, cure, or relief of any distemper, malady, ailment, or disorder incident to, or in anywise affecting the human body, nor to compel the person or persons vending the same to take out the licence required by persons vending medicines."

It has been the custom since the date of this Act (1815) to sell lozenges generally without stamps, by the ounce or in boxes, without recommendation or printed directions, although it had previously been considered necessary to affix a stamp in every instance. The absurdity of requiring a three-halfpenny stamp to be appended to every pennyworth of lozenges was so palpable, that it almost amounted to a prohibition on the sale of small quantities. The only condition now imposed, is the absence of any statement which can be construed into a recommendation, an exclusive sale, or a secret.

We should have been glad if we could have obtained an official announcement from Somerset House, clearing up all doubtful points in reference to the schedule and other parts of the Act, in which the Commissioners exercise a discretionary forbearance. This, however, could not be granted, since an official declaration on the part of the Commissioners, giving any latitude to the vendors of stampable articles, would be equivalent to an admission that they neglect their duty by not enforcing the law to the strict letter.

At the same time, the Commissioners of Stamps have a discretionary power, each individual case being decided on its own merits, and as no penalty is enforced without the particulars of the

case being fully reported at head-quarters, there is a salutary check on the inferior officers, who have no power but to purchase articles supposed to be liable, and to forward the same to Somerset House.

Many of the articles so purchased are consigned to oblivion, the Commissioners in their discretion deciding that they are not to be held as liable. In these cases, the parties from whom the goods were bought, derive the benefit of the sale, without being aware that it was the object of the purchaser to entrap them.

No one can dispute the fact that the Medicine Stamp Act requires revision, when even the officers employed to enforce it are at fault in the exercise of their duty.

From the information which we have given in this and former numbers on the subject, a general idea may be gathered respecting the interpretation of the Act adopted by the Commissioners, and in any particular case in which the law may have been misunderstood, some degree of leniency may be expected at Somerset House. It is clear that we are entirely in the power of the authorities in regard to this Act, and that it is our interest as well as our duty to avoid any known infraction of the law, since a penalty is rarely if ever enforced, unless the party is supposed to have transgressed either with an intention of fraud or from culpable negligence.

FEES TO MEDICAL REFEREES AT INSURANCE OFFICES.

The illiberality of most insurance offices towards medical men, to whom they apply for certificates respecting the health of persons about to insure their lives, has given rise to much discussion in the profession. A medical man receives a communication from the secretary of an insurance office, inclosing a printed list of questions, with a note to this effect: "Mr. ——, or Dr. ——, will oblige the Directors by answering the following questions respecting the health and constitution of ——, at his earliest convenience." It is also stated that the reply "will be considered by the Directors as strictly confidential." In a majority of cases no fee is inclosed; and if the medical practitioner, having complied with the request, should apply for the fee, he is informed that the office has a medical staff, and does not remunerate referees. If he decline to fill up the certificate without a fee, his patient is informed that his medical attendant refuses to comply with the forms of the office, and he is requested to refer the Directors to some other practitioner. Thus the medical man has before him a choice of evils. He must either "oblige the Directors" gratuit-

ously, or place himself in an unfavourable and apparently discourteous position with his patient.

In order to understand fully the injustice of this system, it is requisite to consider, first, What is the object of the reference?—2dly, For whose benefit is it made?—3dly, What is the nature of the professional skill, time, and responsibility involved in the replies to the inquiries?

1st. The object of the reference: The medical officers of the institution see the candidate for the first time under the most favourable circumstances. They have no evidence before them but the actual state of the individual, and it is not to be supposed that a period of ill health would be chosen for such an examination. A person may exhibit all the outward signs of health and vigour, and yet may be liable to attacks, the precise nature of which is known only by the regular medical attendant; but which may, nevertheless involve the insurance of the life in considerable risk. In such a case the answers of the referee may furnish a clue to the most important information, which might influence the decision of the Directors as to the propriety of granting the policy.

2d. For whose benefit is this information? Undoubtedly for the benefit of the office. The candidate is not interested in throwing obstacles in the way of his insurance. He is desirous to insure his life, and he submits to an examination, not from choice or for his own benefit, but because the office imposes the condition. The office is interested in making this investigation as searching and complete as possible, as a security against the heavy loss resulting from the insurance of precarious lives, and it is as an additional security to the office that reference is made to the medical attendant of the candidate.

3d. The professional skill, time, and responsibility involved in the replies to inquiries of this nature are of no ordinary kind. A medical man is called upon to tax his memory respecting events probably spread over a long series of years. He may have occasion to refer to his note-book for particulars which have escaped his recollection, and his professional skill or even his integrity may be called in question in case he should omit accidentally to state any important circumstance. The document which he has to fill up entails upon him much more thought and investigation than an ordinary prescription, in some cases a professional visit or a troublesome correspondence. Nor does the responsibility end here, for he is liable to be called as a witness at a future time in case of a dispute between the office and the representatives of the insured.

For these important professional services all that is claimed is the moderate fee of one guinea, which fee should of course be paid by the party for whose benefit the certificate is given, namely, by

the office. The patient does not receive the information, he is not allowed to see the certificate, which "is considered by the Directors to be strictly confidential." He can derive no benefit from it, for if favourable it could do no more than confirm the opinion of the Medical Officers of the Institution, if unfavourable it may deprive him of the benefit of the insurance, and therefore do him a positive injury. Yet there are some persons who contend that the patient ought to pay the fee! Others, who may be termed the "ultra liberal party," affirm that no fee is required. They consider that it costs a medical man nothing to write answers to a few questions, and that it is no more than an act of courtesy to a patient—To do what? To reveal the secrets of his constitutional peculiarities for the benefit of an insurance office *confidentially to the Directors!* It is notorious that the members of the medical profession perform more service gratuitously to the public than any other class of the community. In the relief of the poor this service is performed cheerfully and without hesitation. But the plea of poverty is not applicable to the case of insurance offices with incomes ranging from £10,000 to £400,000 per annum, and the propensity on the part of such offices to defraud the medical profession should be exposed and resisted.

The late Dr. Sims was, we believe, the first member of the profession who made a stand against this injustice, and he maintained the principle at a personal sacrifice, having declined an appointment with a salary of one hundred pounds a year on the ground that the Directors refused to adopt the principle of remunerating medical referees. Another office (the Britannia) was shortly afterwards established, and the appointment was offered to him. On his naming the conditions on which alone he would consent to be connected with the office, the Directors conceded the point, and established the principle for which he contended. The example has been followed by the Medical Legal and General Life Assurance Office, and the English Widows' Fund.

We take this opportunity of referring to an advertisement of the "Westminster General Assurance Office" on the cover of this journal, which may now be added to the list, the Directors having adopted the practice of remunerating medical referees. We think it incumbent on the members of every branch of the profession to give their support to those offices which have done this act of justice to medical practitioners.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

PHARMACEUTICAL MEETING,

OCTOBER 11th, 1848.

MR. MORSON, PRESIDENT, IN THE CHAIR.

The first business of the Meeting consisted in the Distribution of the Prizes awarded to the successful competitors in the classes of Chemistry and Pharmacy, and Botany. The reports of the Professors were read by the Chairman, from which it appeared that the results of the Examinations had been as follows:—

CHEMISTRY AND PHARMACY.

QUESTIONS FOR EXAMINATION.

1. What is the *force* represented by the *weight* of a body as determined by the use of the balance? Is this force common to all matter? If a substance be weighed in an accurate balance, surrounded by air, would the weight indicated be a correct representation of the force?
2. What is meant by the specific gravity of a body? How is the specific gravity of a solid substance, soluble in water, determined, with reference to water as unity? Describe the method of making the determination, illustrating it by an assumed case.
3. What is the distinction between *statical* and *dynamical* or *current* electricity? How are these two modifications of the electrical force excited? Explain the phenomena of electrical induction. In a simple voltaic circuit, consisting of a copper and zinc plate immersed in diluted acid, which is the positive and which the negative plate, and to what parts are the terms *anode* and *cathode* applied? Explain the meaning of the terms *electrode*, *electrolysis*, and *electrolyte*.
4. What is the meaning of the term *specific heat*, and how is the specific heat of bodies determined? What is the meaning of the term *latent heat?* What is the latent heat of *water*, and of the *vapour of water*, and is the latter the same at all temperatures, or what is the law with reference to it?
5. What are the theories generally received among Chemists, with reference to the constitution of salts? Explain the doctrine of Isomorphism.
6. Describe the compounds of *copper*, *zinc*, *bismuth*, and *arsenic*, especially those used in medicine, stating the natural sources from which they are derived, and giving the processes for their preparation.
7. State the composition of *starch*, *dextrine*, *cane-sugar*, *grape sugar*, and *mannite*, and the conditions under which some of these bodies are produced from others of them.
8. Describe the changes which occur in the production of *alcohol*, and of *acetic acid*, from sugar—of *aldehyde* from alcohol—of *benzoic acid* from oil of bitter almonds—and of *gallic acid* from tannin.
9. Describe the best methods of determining the strength or purity, as the nature of the case may indicate, of the following substances:—*acetic acid*, *citric acid*, *dilute hydrocyanic acid*, *calomel*, *carbonate of potash*, *nitrate of silver*.
10. How is the presence of nitrogen in an organic body detected, and what is the method of determining its quantity?

T. Redwood, *Professor.*

Prizes and Certificates were awarded to the following :—

LECTURE PUPIL.

PRIZE.....Mr. Swann.

LABORATORY PUPILS.

FIRST PRIZE.....Mr. R. W. Giles, Clifton.
SECOND PRIZE .....Mr. Copeland.

CERTIFICATES OF MERIT.—Mr. Braithwaite.
Mr. Harrison.
Mr. Starkie.

GENERAL AND MEDICAL BOTANY.

VIVA VOCE EXAMINATION.

Plants submitted to the candidates, who were required to name them—to state the order in the Natural System to which each belongs—and to mention any peculiar feature in any of the plants :—

Ord. Ranunculaceæ.—Delphinium *staphysagria*, Aconitum *vulgare*, Ranunculus *lingua*.
Cruciferæ.—Sinapis *alba*.
Valerianaceæ.—Valeriana *officinalis*.
Compositæ.—Centauria *cyanus*, Lactuca *virosa*, Lactuca *sativa*, Matricaria *chamomilla*, Anthemis *nobilis*, Anacyclus *pyrethrum*.
Solanaceæ.—Datura *stramonium*, Hyoscyamus *niger*.
Scrophulariaceæ.—Gratiola *officinalis*.
Labiatæ.—Salvia *sclaria*, Marrubium *vulgare*, Origanum *vulgare*, Mentha *viridis*.
Solanaceæ.—Nicotiana *tabacum*, Capsicum *annuum*.
Polyganaceæ.—Polygonum *bistorta*.
Euphorbiaceæ.—Euphorbia *lathyris*.
Rutaceæ.—Ruta *graveolens*.
Coniferæ.—Juniperus *communis*. In all 24 plants.

WRITTEN EXAMINATION.

Questions to be answered.

1. Describe the following organs, and the parts of which each is composed :—*root, rhizome, tuber, cormus, bulb.*
2. What parts are brought into view in the transverse section of the trunk of a tree, and what is the structure of each part ?
3. Describe the various kinds of inflorescence.
4. What distinguishes a compound flower from an aggregate flower ?
5. What are the distinguishing characters of the following fruits :—*achenium, follicle, capsule, pome, drupe, nut, berry, pepo, legume, liment, silique, silicule, cone, strobile, galbalus.*
6. Describe the ascent of the sap ; the power which carries it upwards ; the changes which it undergoes in the leaf ; and also the part of the plant by which the proper juice descends.
7. Name the plant of which the following is the description—*the class, sub-class*, and *order*, in the natural system to which it belongs—the part of the plant employed in medicine—and the period at which it should be gathered, in order to ensure its remedial efficacy.

A biennial. The *root* consisting of many long slender fibres : *stem*, none in the first year, in the second, straight, wand-like, roundish with slight obtuse angles, leafy, rising from three to four feet in height :

leaves alternate, nearly ovate, strongly veined, rugose, crenate, villous, of a deep green on the upper disk, and tapering at the base into a winged petiole ; the lower, or radicle leaves as they are termed, the largest. *Flowers* in a long, unilateral, simple, erect terminal raceme : *calyx* much shorter than the corolla, composed of five acute, permanent, sepals—the uppermost narrower than the rest : *corolla* monopetalous, campanulate, ventricose,contracted at the base, the limb oblique, with the upper lip emarginate, the lower trifid, the middle lobe the largest; the colour crimson, elegantly speckled with eye-like spots,and furnished with hairs within, large, pendulous, and scentless : *stamens* didynamous, inserted into the base of the corolla : *anthers* acute : *stigma* bilamellate : *capsule* ovate, with a septicidal dehiscence : *seeds* very numerous, small, oblong, pale brown, pitted.

ANTHONY TODD THOMSON, *Professor.*

The values of the answers furnished by the several competitors, were indicated by numbers set against their names or mottos, in both the oral and written examination. In relation to the successful competitors the numbers stood as follows :—

	Oral.		Written.		
Mr. Trask	24	+	98	= 122	FIRST PRIZE.
Mr. R. W. Giles.....	20	+	100	= 120	SECOND PRIZE.
Mr. Braithwaite	19	+	98	= 118	CERTIFICATES OF MERIT.
Mr. Walker	20	+	95	= 115	
Mr. R. S. Starkie.....	21	+	93	= 114	

The following papers were then read :—

ON DRUG-GRINDING.

BY MR. THEOPHILUS REDWOOD,

Professor of Chemistry and Pharmacy to the Pharmaceutical Society.

A LARGE proportion of the solid substances employed in medicine, are submitted to certain processes by which they are reduced to powder, either as a preparatory step to subsequent pharmaceutical processes, or to fit them for administration in the solid state. It is, therefore, an interesting and important question—whether, and to what extent, do the operations connected with the pulverization of drugs affect their composition, strength, and general medicinal efficacy ?

Every Druggist is familiar with the usual method of powdering drugs by the use of the pestle and mortar. This is the process usually adopted by the retail pharmaceutist. But the greater part of the drugs which are used in powder are reduced to that state previously to their passing from the wholesale dealers, and in these cases the process is generally conducted by persons who make it their special business, and who are called *drug-grinders.* The establishments at which drugs are thus reduced to powder, are called *drug-mills,* and the implements used there for effecting the disintegration of the drugs, are the *grinding-mill* and the *stamping-mill.*

The essential features of the means by which disintegration is effected at the drug-mills, are the same as those which characterize the more familiar processes of the Druggist. In both cases comminution is effected by *contusion* and by *trituration*.

The Druggist effects the pulverization of drugs *by contusion*, with a pestle and mortar made of some hard metal—either iron or bell-metal.

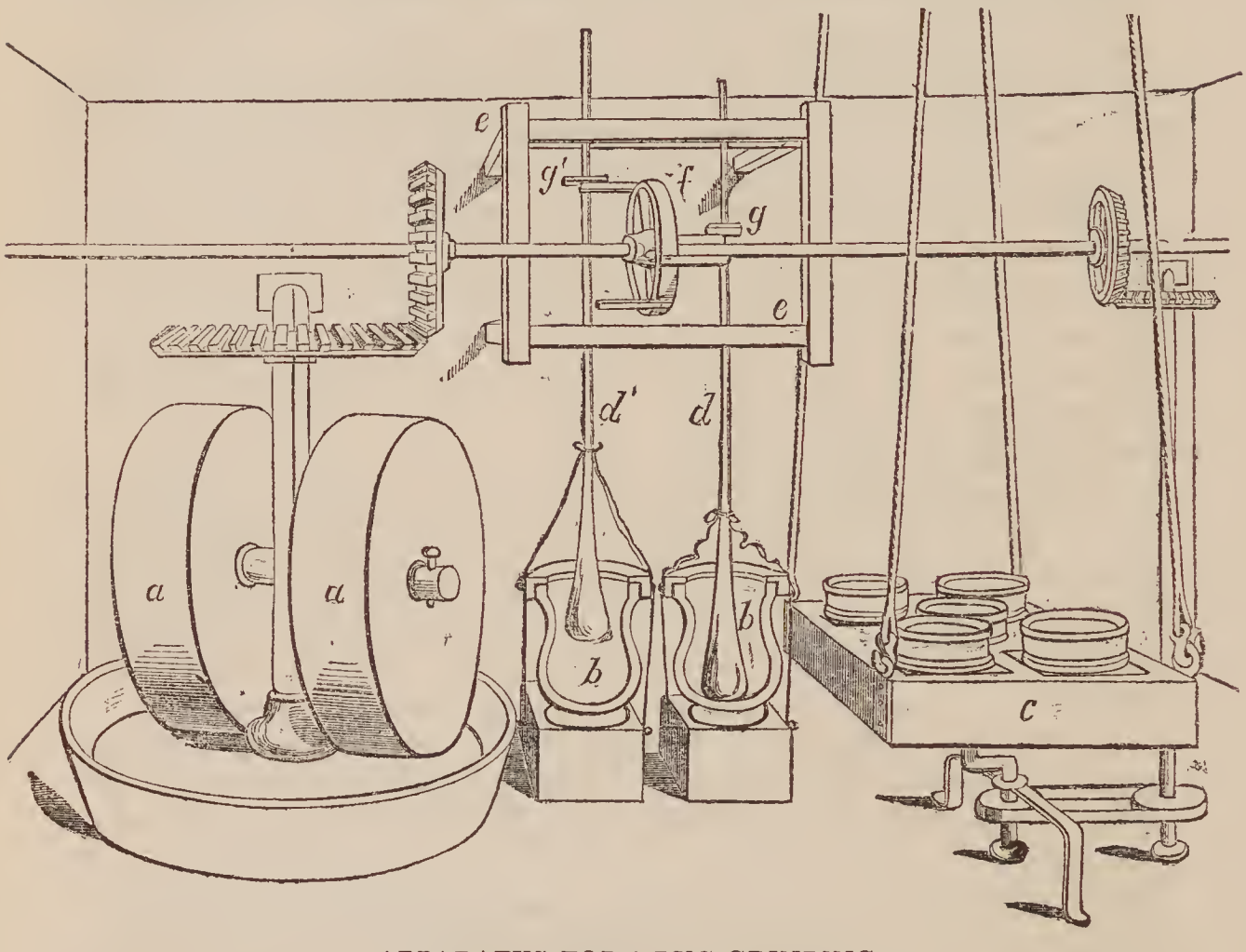
The drug-grinder also reduces drugs to powder, in some cases, *by contusion*, and his implements are the pestle and mortar, which differ but little from those used by the Druggist. But the pestle and mortar of the drug-grinder is called a *stamping-mill* or stamper. The pestle, instead of being worked by manual labour, is raised by machinery, and allowed to fall with the impetus of its own weight, as shown at *d e f g* in the drawing at page 220. These pestles usually weigh from thirty to fifty or sixty pounds. The mortars, which in common with the pestles or stampers are of iron, are not larger than those commonly used for powdering drugs with the spring-pestle.

The Druggist effects the pulverization of drugs *by trituration*, with a pestle and mortar, usually made of marble. Sometimes he uses the porphyry slab and muller, but this method of operating is of rare occurrence. There are also a few cases in which the substance to be powdered is merely rubbed over the surface of a sieve.

The drug-grinder also reduces drugs to powder *by trituration*, and this indeed, is the principal mode of operating adopted at the drug-mills. But the apparatus employed by the drug-grinder for powdering by trituration, differs greatly from that used for a similar purpose by the Druggist. The triturating implement of the drug-grinder, is usually called the drug-mill; when used for other purposes, it is sometimes distinguished as the pugging-mill. It consists of two stone cylinders, (*a a*) commonly called the runners, four or five feet in diameter, and twelve or fifteen inches in thickness, which are trundled round a central beam working on a spindle. This mill is a most efficient instrument for effecting the comminution of drugs. The runners, which are made of granite or other hard stone, and usually weigh a ton or more, break down or tear asunder the hardest and toughest substances. The disintegration is effected partly by the weight of the stone, and partly by the grinding or triturating action produced in consequence of the outer and inner edges of the revolving cylinder, which are both equal, being made to perform unequal circuits in the same time. Thus, if either of the cylinders were simply trundled without controul, it would proceed in a straight line, but being made to describe a circle immediately around the central beam, the outer edge of the cylinder has to travel through a longer path than that

assigned to the inner edge, so that every advance onwards, by which the weight or pressure is imposed upon a new surface, is accompanied by a lateral friction caused by the unequal progression of the two edges of the cylinder.

A drug-grinding room usually contains a pair of stones (*a a*), a set of five or six stampers such as *b b*, and a sifting apparatus (*c*).



APPARATUS FOR DRUG-GRINDING.

a a. The drug-mill.
b b. The stampers.
e e. The guiding-frame for stampers.
c. The sifting apparatus.

The sifting-apparatus consists of a square wooden frame (*c*), in which there are five or six octagon-shaped holes for the reception of the sieves. This frame is suspended from the ceiling by four ropes or chains, and its peculiar motion is effected by a rotating crank working in a socket in the bottom of the frame. A very irregular and jerking motion is thus imparted to the frame, and from thence to the sieves, by the joint action of the revolving crank, and of the ropes by which the frame is suspended. The sieves employed in the process are the common drum-sieves.

The first operation connected with the grinding of drugs consists of drying them. If they are in large masses, they are cut or broken into small pieces to facilitate the drying process, and also to prepare them for being put under the stones when dry enough to be powdered. The drying is generally effected in a room

heated to about 120°, by means of a stove or steam-pipe. The most common method of heating the drying-room appears to be by the use of a cockle, that is, a stove having an outer case or jacket, between which and the fire-case there is a space for the circulation of air. A great many different forms are given to the cockle, which is sometimes made of iron and sometimes of brick; but it should always be so placed that the fire can be fed from the outside of the room, so that the atmosphere of the room may not be contaminated with smoke or dust. The substances to be dried are spread out on trays, which are placed on open frames around the room.

The drying process being completed, the substance is placed on the platform of the mill, in the path of the stone runners, where it is ground until sufficiently comminuted for the commencement of the next operation, namely, that of sifting it. The two operations of grinding and sifting are then continued simultaneously, the operator transferring a portion of the powder from the mill to one of the drum sieves, which latter, with its contents, is put into its appropriate receptacle in the frame of the sifting apparatus, where it is subjected to the requisite succussion. The residue, which does not pass through the sieve, is returned to the mill, and a fresh portion of powder taken out to be sifted; and this mode of proceeding is continued without suspending the motion of any part of the machinery, until the process is nearly finished.

In using the stampers, it is necessary to suspend the pounding or stamping while the substance under operation is being removed from, and introduced into, the mortar, which somewhat retards the process.

The facility with which drugs are reduced to powder depends in great measure upon the extent to which they have been previously dried. If they be not deprived of their hygrometric water to the greatest extent practicable by exposure in the drying-room, it will be difficult, if not impossible, to produce perfectly smooth and impalpable powders, such as are now generally used in medicine. This drying is, of course, accompanied by a diminution of weight, arising from the loss of water and other volatile constituents, which varies considerably in different drugs, and also in different specimens of the same kind of drug. There is always, however, a little moisture again absorbed during the process of grinding.

There are some drugs which, however carefully they may be dried, are, nevertheless, with great difficulty reduced to powder by the ordinary method of proceeding. Nux vomica, St. Ignatius's beans, and the tuberous roots of the orchis, belong to this class. They are tough and horny, and can hardly be powdered without a particular treatment. The best method of preparing nux vomica

and St. Ignatius's beans for pulverization is to expose the seeds to the action of steam until they have swelled to about twice their original size, and then to dry them rapidly in the drying-room. The roots of the orchis, which are ground to make saloop-powder, should be macerated in cold-water until they have become soft, and then dried, as in the other case. After being thus treated they are easily powdered.

Some substances cannot be powdered alone; they require the addition of other bodies which facilitate the disintegration. Thus the addition of a few drops of spirit renders the pulverization of camphor easy, although it could not be effected without it. Agaric is a substance which it is extremely difficult to powder alone, and a method has therefore been proposed for powdering it *by mediation*. It is cut into small pieces, wetted with mucilage of tragacanth, and then dried, previously to submitting it to the process of grinding. The addition of a foreign body which the powder retains, cannot, however, be sanctioned, excepting under particular circumstances, such as the impossibility of otherwise effecting the object. It is stated in some pharmaceutical works that colocynth is powdered by mediation, in the same way as that above described for the pulverization of agaric; but in this case the addition of a foreign body is certainly unnecessary, and I am informed that no such addition is made by the drug-grinders in this country.

The foregoing is a general outline of the various methods adopted in effecting the pulverization of drugs. We may now return to the question,—how far do these processes affect the composition, strength, and general medicinal efficacy of the substances operated upon?

The operations connected with the processes of drug-grinding do not seem to be calculated to promote chemical change in the constituents of the powder; for, although the disintegration, by exposing a larger surface to the action of the air, may be somewhat unfavourable to the permanence of the proximate constituents of vegetable substances, yet the complete desiccation which forms part of the process will exercise a conservative influence to probably an equal extent. This, at least, would be the case if the powder, when prepared, be put into close bottles, and kept for only a moderate length of time.

The principal, if not the only necessary, cause of deterioration to the products, is the long-continued application of the degree of heat to which the drugs are exposed in the drying-room. There are some substances which cannot be thus dried without having a portion of their active volatile ingredients driven off, as well as the water they contained. The strong smell which fills the drying-room when opium, or myrrh, or cinnamon, are under operation, affords sufficient evidence that some volatile matter besides water

is escaping, and that the resulting powders cannot strictly represent the drugs from which they are made. All substances which contain volatile principles must lose a portion of these during the drying process which precedes, and sometimes accompanies that of pulverization; and if the efficacy of the medicine depend upon these volatile parts, the product must be injured by the process to which it is submitted. Thus myrrh, valerian, cardamoms, cinnamon, and spices generally, lose some of their efficacy in being reduced to fine powder.

But a large proportion of our drugs are not subject to deterioration from loss of volatile constituents; and in these cases, if care be exercised in conducting the process of drying, the powders obtained by the usual method of operating will possess all the medicinal properties of the crude materials. Rhubarb, jalap, ipecacuanha, colocynth, scammony, gamboge, and many other drugs, are not necessarily injured in the process of powdering.

There are some drugs which not only suffer no injury in being powdered, but which actually contain, when pulverized, a larger proportion of the active constituents than were present in the crude unpowdered substance. This arises from the circumstance that the less active parts are separated and rejected during the process. Thus, for instance, the powder of ipecacuanha, if properly prepared, contains more of the emetic principle than the root from which it is made. The principle upon which the emetic property of ipecacuanha depends, exists chiefly in the cortical part of the root, and as this is the most easily pulverizable, it passes first through the sieve, while the less active ligneous part, being more tough, remains to the last, and should be rejected as gruffs.

Besides the loss of water and other volatile constituents, which are driven off in the drying-room, there is also necessarily a dissipation and loss to a certain extent of solid particles of powder, which are diffused through the atmosphere of the room in which the pulverization is conducted, or which adhere to the apparatus.

With these exceptions the product, including the gruffs or unsifted part, ought to be identical with the substance it represents; that is to say, should consist of the same particles, and no others, in the same chemical condition as they existed in previously to the process of powdering.

If no active constituents be lost in the drying process, the strength of the powder will be greater than that of the crude drug, to the extent of the quantity of water and inactive matter which have been separated and rejected. It would be very desirable to ascertain what the average increase of strength is in those drugs which suffer no deterioration in the process of powdering; and also what is the exact nature of the deterioration necessarily sustained by drugs, such as myrrh, ginger, cardamoms,

and cascarilla, which contain, and must therefore lose active volatile constituents.

Next to the preservation of the medicinal efficacy of the drug, the most important object for attainment is uniformity of strength in the product. What security has the physician that a grain of opium or ten grains of jalap obtained from a particular source shall be equivalent to the same quantities of those substances obtained elsewhere ?

There are several causes which tend to affect the uniformity of the strength of those medicines which consist of parts or crude products of plants. In the first place, these drugs, in their natural or original state are not uniform in composition and properties. Different specimens of cinchona bark yield very different proportions of the alkaloid upon which the efficacy of the drug depends —other drugs differ to an equal extent ; in fact, what drug can be mentioned of which there are not good and bad specimens, in their natural state, to be met with in the market ? The practical knowledge and experience of the Druggist are called into requisition in selecting the good from the bad, and thus two classes, at least, are formed. There may be some approach to uniformity in each of these classes, but what uniformity is there between them ? It must be admitted, however, that the criterions of excellence usually adopted in these cases are often founded upon qualities of an extrinsic character, which have no definite relation to medicinal properties.

Passing, then, from this source of disparity in quality and strength, and having selected the best specimens of the crude drugs, what further causes are there which may affect the uniformity of their properties when in more advanced states of preparation ?

Much has often been said on the subject of the adulteration of drugs, and especially of those drugs which are used in the state of powder. That drugs are sometimes adulterated is a notorious fact. That the practice of adulteration has prevailed to an extent greatly prejudicial to the advancement of the science of medicine, and discreditable to the medical legislation of the country, admits not of a doubt. But a great and progressive improvement has certainly taken place for many years past, and there is, at the present time, an evident desire among wholesale and retail druggists, to discourage and suppress the sale of bad and adulterated drugs.

We may pass over the statements, some of them greatly exaggerated, which have been published with reference to the wholesale substitution of fabricated powders for the drugs represented. Such statements relate to bye-gone days, and they probably represent what were, even then, uncommon exceptions to the practice generally pursued. There is reason to believe,

however, that absolute identity of composition between the powders used in medicine and the drugs they represent, is not always maintained to the greatest practicable extent, even in the present day. The art of drug-grinding has undergone considerable improvement within the last twenty or thirty years. Many of the powders now prepared are very different in appearance from those which formerly were used; and much more attention is now paid to colour and other external characters. But, is it not to be feared that the high estimation in which *good-looking* powders are held, may cause the adoption of certain methods of dressing them, and artificially improving their appearance? There is reason to believe that a small quantity of turmeric or other colouring matter, is sometimes used for the purpose of brightening and improving the colours of some powders, and that oil is also added in some cases, during the process of comminution, with a similar object. These additions are made in such small quantities, that they probably would not occasion any appreciable difference in the action of the medicines, but the fact that any such means are adopted establishes the necessity for some better criterions of quality than mere appearances.

There is yet another source of disparity in the quality and strength of powdered drugs, which consists in a conventional practice of the trade with reference to the allowance made for loss of product during the process of grinding.

It has already been stated that the loss of weight which drugs undergo in grinding, is occasioned by the evaporation of water and other volatile constituents in the drying-room, and by the waste from dissipation in the form of dust, and from adhesion to the apparatus, in the grinding-room. It must be obvious that the amount of loss thus sustained will not be uniform; it will vary according to the nature of the substance under operation, and even with substances of the same nature, the loss will depend upon the quantity operated upon at a time, and their state of dryness when sent to the mill. Some drugs are frequently met with in commerce in a perfectly moist state, such as opium, aloes, scammony, and jalap. The loss of weight in drying these drugs, must of course be considerably greater than that which occurs with other less moist specimens, or with substances, such as rhubarb, ipecacuanha, or bark, which are never met with in a moist state. Now, there is in this variable condition of drugs as to dryness, a source from which disagreement might arise between the druggist and the drug-grinder, which probably led to the adoption of a practice in the trade of making a uniform allowance for loss of weight in grinding, whatever the nature or quality of the drug might be.

The rule adopted among the London drug-grinders, has been to have allowed to them four pounds on every hundredweight of the substance ground, for loss in the process. Thus, if a hundredweight of rhubarb were sent to the drug-mills, 108lbs. of powder, including the gruffs, would be returned. It matters not what condition the rhubarb might be in, the drug-grinder would be expected to produce 108lbs. of powder from 112lbs. of raw material. The same allowance would also be made, unless otherwise agreed between the parties, for all other drugs which required drying previously to their being powdered. In some cases the practice appears to have been to receive 116lbs. of the undried drug, and to return 112lbs. of dry powder. This is called the four per cent. system, four pounds being the allowance for loss upon every hundredweight of substance powdered. Some substances however, such as cream of tartar and sulphuret of antimony, do not require to be dried before being powdered, and the allowance for loss on these substances is only two per cent.

This, which is commonly called the per centage, or four per cent. system, was at one time generally, if not uniformly, adopted by the drug-grinders of London, and although it has to a great extent been relinquished, having been wholly departed from by some houses, and partially by others, yet there are those who still contend that the specified allowance is a fair average of the loss necessarily occurring in the process of drug-grinding.

Being convinced of the injurious tendency of the four per cent. system, I applied to several parties engaged in the business of drug-grinding for information on the subject, and am indebted to one of these parties for a statement extracted from their books, showing the loss sustained in powdering drugs at their mills. Every drug powdered at the establishment alluded to, is weighed when received at the mill, and the ground products, consisting of fine powder and gruffs, are again weighed before being returned to the Druggist. These weights are all entered in their books, a separate account being kept for each kind of drug, so that by taking an average of the results upon large quantities, consisting of a great number of specimens received from different Druggists, a near approach to a correct estimate is no doubt attained. The results nearly coincide with those observed by other drug-grinders from whom I have received information.

The first column of figures in the table represents the whole quantity of the specified drug which has been ground at several different periods; the second column indicates the greatest amount of loss on any one specimen; the third column indicates the smallest amount of loss on any one specimen, and the last column gives the average upon the whole.

Name of Drug.	Total weight.	Greatest loss per cwt. (112 lbs.)	Smallest loss per cwt. (112 lbs.)	Average loss per cwt. (112 lbs.)
	lbs.	lbs. oz.	lbs. oz.	lbs. oz.
Aloes, Barbadoes	379	9 12	0 7	5 12
" Hepatic	997	16 8	3 8	9 6
" Socotrine	882	12 0	4 0	9 4
Calumba root	733	12 0	1 12	6 6
Canella alba	460	12 0	1 0	9 0
Cantharides	1006	3 0	—	1 8
Cardamoms	348	9 8	2 10	5 12
Cascarilla bark	794	8 14	2 0	6 0
Cinchona bark, pale	1547	7 8	4 0	6 6
" " yellow	1039	11 0	2 8	6 2
Colocynth	1034	11 8	3 8	6 8
Cubebs	1551	2 10	—	1 10
Dragon's blood	1004	13 0	1 4	5 12
Elecampane	1585	16 0	2 12	9 3
Fœnugreek	2593	13 0	2 0	7 10
Gamboge	1009	6 8	1 0	2 12
Gentian root	5368	16 0	4 0	9 4
Ginger, Jamaica	8046	12 8	6 0	7 10
Gum Arabic	11,215	12 0	4 0	8 0
Ipecacuanha	2579	7 0	1 4	5 3
Jalap	9446	15 8	5 0	8 12
Liquorice	1255	12 0	—	6 3
Myrrh	2762	16 0	3 12	8 6
Opium	505	18 0	6 0	14 14
Orris root	3625	10 12	4 3	6 12
Rhatany	81	8 0	2 10	6 0
Rhubarb, English	1346	12 0	3 0	7 13
" Indian	5777	7 0	2 0	6 0
" Turkey	2018	8 4	3 0	5 12
Sarsaparilla, Jamaica	689	14 0	1 12	10 1
Scammony	1161	13 0	2 8	7 4
Seeds, Anise	2839	16 0	1 0	5 6
" Caraway	1569	13 8	2 8	8 12
" Coriander	1063	16 14	1 4	5 9
" Cummin	1142	12 0	1 4	5 4
Senna	606	11 8	3 8	6 6
Squill	974	15 0	8 0	12 8
Tormentilla root	231	12 8	2 0	6 12
Tragacanth	2077	13 12	6 12	8 4
Turmeric	5663	8 0	1 8	4 0
White Hellebore	5533	10 12	2 2	6 4
Valerian root	279	16 8	4 0	8 8

It appears from this table that the average loss in powdering drugs is more than four per cent. in nearly all cases, and that in some it is considerably more. Now, it could not be reasonably supposed that the drug-grinder would in any case supply good rhubarb or jalap, gentian or ginger, for the water which had been imbibed in a damp warehouse or cellar. If he be required to

make up a certain quantity of powder, evidently more than the crude drug produces, how is he to do it? Is he to keep a stock from which to supply the deficiencies of all the drugs he grinds, and go to market and purchase more when his stock is exhausted, or is there some magical power in his mill?

A drug-grinder's mill is a very different thing from the pestle and mortar of the druggist, although they are both employed for the same purpose. The druggist, when he has used the pestle and mortar, cleans them preparatory for the next operation, by washing them with water. The drug-grinder also requires to clean his mill. Rhubarb must not be ground after aloes, nor ginger after jalap, without previously well cleaning the ponderous stones and other parts of the apparatus. But how shall this be done? A drug-mill cannot be cleaned by washing it with water—if for no other reason, it would be objectionable on account of its making the room and apparatus damp, which are required to be perfectly dry. Instead of water, sawdust is used for cleaning the drug-mill. After grinding any drug, in order to remove the adhering particles from the mill, sawdust is ground until the mill is rendered sweet and clean.

Sawdust, then, is indispensable at a drug-mill, as necessary as water is in a druggist's shop, and if the druggist sends damp jalap, containing fifteen per cent. of water, to be ground, and requires dry powder to be returned, with only four per cent. of deduction for loss, he adopts a conventional method of asking for some of the rinsing of the mill—a veritable "powder of post."

The four per cent. system cannot fail, wherever it is adopted, to induce a reduction in the strength of powdered drugs. If this reduction had tended to equalize the strength of different specimens, there might have been some excuse for it; but the effect of the system must obviously be to cause a reduction in an inverse ratio to the previous strength of the drugs, so that the weakest and worst drugs will be most diluted. But this objection which applies to the very principle of the system, is not the most serious objection to which it is subject. It sanctions the practice of admixture, and affords facilities for those who are so disposed to pursue a ruinous competition in price at the sacrifice of quality.

There are two causes which, I believe, principally tend to frustrate the efforts of those who are endeavouring to put a stop to the adulteration of drugs, and to provide for the supply of medicines of the best quality; one is, the sale of cheap medicines by grocers and others not educated as Pharmaceutists, who are unable to distinguish the good from the bad, or indifferent as to which they sell; and the other is, the continuance, to whatever extent it may still prevail, of the four per cent. system in connexion with drug-grinding—a system which has no claim for support, save the old-

established usage of the trade. It should be the enlightened policy of an educated body of Pharmaceutists to afford a fair remuneration for honest industry; and this being secured, both druggist and drug-grinder would rejoice to be relieved from the trammels which have been heedlessly and most injuriously ingrafted upon the system of drug-grinding.

ON THE LIGHT AND HEAVY VARIETIES OF CARBONATED AND CALCINED MAGNESIA.

BY JONATHAN PEREIRA, M.D., F.R.S.

HAVING recently directed my attention to the microscopic characters of the commercial varieties of magnesia, both carbonated and calcined, with the view of elucidating the precise physical differences between the heavy and light kinds, I beg to lay the results of my investigation before the Members of the Pharmaceutical Society.

1. OF THE CARBONATES OF MAGNESIA OF ENGLISH COMMERCE.

Eight compounds of carbonic acid and magnesia have been described; of these four are subcarbonates, three are neutral or monocarbonates, and one is the bicarbonate. The following is their composition:—

Subcarbonates..	$\frac{2}{3}$ Carbonate, terhydrated	3 Mg O, 2 CO_2, 3 HO	*Fritzsche*
	$\frac{4}{5}$ Carbonate, quadrohydrated (*hydromagnesite*)	4 Mg O, 3 CO_2, 4 HO	*Kobell*
	$\frac{4}{5}$ Carbonate, pentahydrated	5 Mg O, 4 CO^2, 5 HO	*Fritzsche*
	$\frac{4}{5}$ Carbonate, hexahydrated (*English magnesia alba*)	5 Mg O, 4 CO^2, 6 HO	*Phillips, Fownes*
Neutral or Monocarbonates	Anhydrous carbonate (*magnesite*)	Mg O, CO_2	*Stromeyer*
	Terhydrated carbonate (*crystallized*)	Mg O, CO^2, 3 HO	*Berzelius, Soubeiran*
	Pentahydrated carbonate (*crystallized*)	Mg O, CO^2, 5 HO	*Fritzsche*
Bicarbonate....	*In solution*	Mg O, 2 CO_2	*Soubeiran.*

It is well known that under the name of *magnesia alba*, or *carbonate of magnesia*, two compounds of carbonic acid and magnesia are found in English commerce, one commonly known as *light carbonate of magnesia*, the other as the *heavy carbonate of magnesia*. The latter does not occupy more than a third of the bulk of the former, and is, therefore, greatly preferred by the pharmaceutist on account of its convenience in dispensing. Mr. Fownes*, who submitted both varieties to analysis, states that "their chemical composition is sensibly the same, and that their difference of density arises solely from their mechanical condition." I was, therefore, very anxious to ascertain the precise physical difference between the particles of the one and those of the other.

1. *Light carbonate of magnesia.*—I have submitted many

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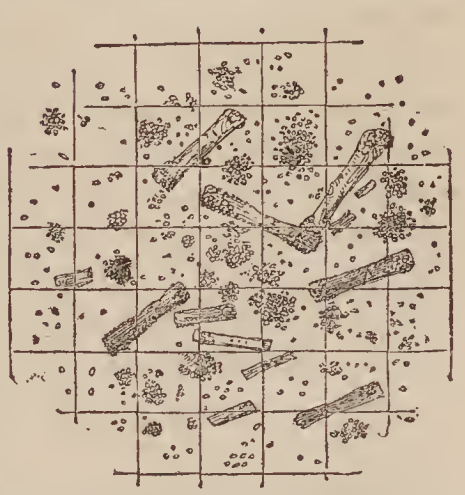
* *Pharmaceutical Journal*, vol. iii., p. 478, 1844.

varieties of light carbonate of magnesia of the shops to microscopic examination, and find all of them identical in structure. They consist of amorphous particles intermixed with prismatic crystals.

The amorphous particles are very minute, and readily cohere together, forming soft rounded balls or pellets.

The crystals are slender, rectangular prisms, and appear as if they had effloresced. Many of them are somewhat swollen at their extremities. Sometimes they resemble in form small bar magnets, to whose extremities iron filings are attached.



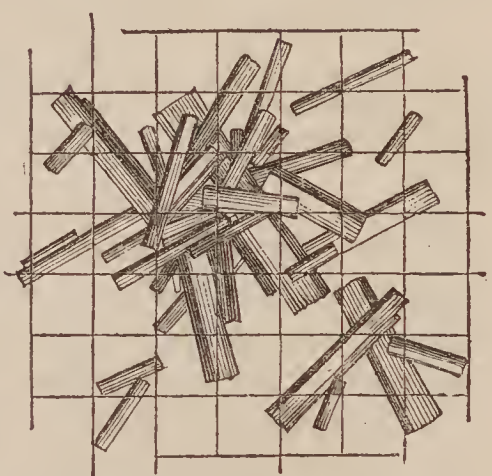
Microscopic Appearance of Light Carbonate of Magnesia.

The carbonate of magnesia in small cubical cakes, commonly called *carbonate of magnesia in squares*, has the same structure as the common pulverulent light carbonate of the shops, to which variety it, therefore, belongs.

Light carbonate of magnesia is distinguished from the heavy carbonate by the presence of these prismatic crystals, as well as by certain negative characters hereafter to be mentioned. By way of contradistinction to the latter kind, it might be denominated the *prismatic* magnesia alba.

The microscope then clearly proves that light carbonate of magnesia is a mechanical mixture of two substances, one crystalline, the other amorphous.

On comparing these crystals with the transparent six-sided prisms (Mg O, CO_2, 3 HO) deposited from fluid magnesia (*aqua magnesiæ bicarbonatis*) their forms appear to be similar. The prisms contained in light carbonate of magnesia, are smaller and less transparent than those deposited from fluid magnesia, and they are rough externally, as if they had effloresced, especially at their extremities; but in other respects they appear to be identical.



Crystals of the Hydrated Neutral Carbonate of Magnesia deposited from Dinneford's Solution.

The origin of the crystals in the two cases appears to be analogous: in both they are deposited from an aqueous solution of the bicarbonate of magnesia. In the case of those deposited from fluid magnesia, this origin is obvious. In the case of the crystals found in the common light carbonate of magnesia, their origin is thus explained. When a cold neutral solution of sulphate of

magnesia is decomposed by carbonate of soda, the neutral carbonate of magnesia which is at first produced, is decomposed by the water, and converted into a soluble supercarbonate and an insoluble subcarbonate ; the latter is precipitated in an amorphous condition. The compound of magnesia and carbonic acid which remains in solution, is, according to Soubeiran*, the bicarbonate ; this undergoes decomposition, gives out carbonic acid, and deposits crystals of the neutral carbonate.

The common carbonate of magnesia of the shops is usually regarded as a chemical compound of carbonate and hydrate of magnesia ; the microscope clearly proves that it is a *mechanical mixture* of two magnesian compounds, of which one is the neutral carbonate.

The crystals deposited from fluid magnesia, have been analyzed by Berzelius, Soubeiran, Dr. Davy, and others. According to the analyses of the two first mentioned Chemists, they appear to consist of the *terhydrated neutral carbonate of magnesia*, Mg O, CO_2, 3 HO. Berzelius says, that in dry air and at a moderate temperature, they give out their water and become milky and opaque, but retain their carbonic acid as well as their shape. Fritzsche, on the other hand, says, that they are permanent in the air. The appearance of the prismatic crystals in light carbonate of magnesia seems to prove that they have effloresced.

It remains now to examine the nature of the amorphous particles which constitute so large a portion of the light carbonate of magnesia of the shops. Like the prismatic crystals they effervesce on the addition of a strong acid : they contain, therefore, carbonic acid.

According to Mr. Fownes, light carbonate of magnesia consists of

Magnesia	42.8
Carbonic Acid	36.0
Water	21.2
	100.0

These numbers correspond very nearly to

	Atoms,	Equivalent weight.	Per cent.
Magnesia	5	100	41.3
Carbonic Acid	4	88	36.3
Water	6	54	22.4
Light magnesia alba	1	242	100.0

Now, if we deduct the constituents of the crystallized neutral carbonate of magnesia, Mg O, CO_2, 3 HO, from those of light magnesia alba, 5 Mg O, 4 CO_2, 6 HO, there remain 4 Mg O,

* *Journal de Pharmacie*, t. xiii., p. 600, 1827.

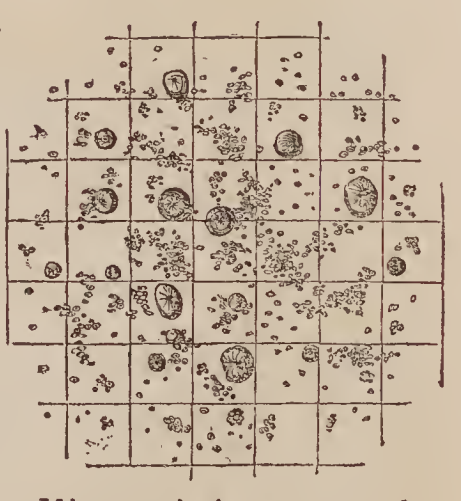
3 CO_2, 3 HO, to represent the composition of the amorphous constituent. But as it is probable, from what I have before stated, that the crystals of neutral carbonate have undergone efflorescence, the amorphous constituent must, in that case, contain more water than the above formula represents. It is impossible to determine experimentally whether the crystals contained in the light carbonate have lost the whole or only a portion of their water. That they have lost some is tolerably evident from their effloresced appearance. As they retain their original shape, it is improbable, I think, that they should have lost the whole of it, though Berzelius asserts that they retain their form when they have been deprived of all their water. Moreover, if we were to assume that these crystals were anhydrous, the amorphous compound would be represented by 4 Mg O, 3 CO_2, 6 HO. Such a compound is unknown. In fact, the only three-quarter carbonate known is the quadrohydrate, which appears to be a stable compound, since it is found in the mineral kingdom, forming *hydromagnesite*, and moreover, has been prepared artificially by Berzelius by the action of an alkaline carbonate on sulphate of magnesia. Now, assuming that the crystals had lost one equivalent only of water, and were composed of Mg O, CO_2, 2 HO, the amorphous subcarbonate would then consist of 4 Mg O, 3 CO_2, 4 HO; in other words it would be identical with the native *hydromagnesite* (on amorphous substance) as well as with Berzelius's *magnesia alba.*

According to this view then common light carbonate of magnesia of the shops is a mechanical mixture probably of

Crystallized hydrated neutral carbonate.....	Mg O, CO_2, 2 HO
Amorphous hydrated $\frac{3}{4}$ carbonate	4 Mg O, 3 CO_2, 4 HO
Light magnesia alba.....	5 Mg O, 4 CO_2, 6 HO

It is probable, however, that the relative proportions of the two salts is liable to variation; for in some specimens of light magnesia alba, I have found the prismatic crystals more abundant than in others.

2. *Heavy carbonate of magnesia.*—I have examined many varieties of the heavy carbonate of magnesia of commerce, including Howard's, as well as that prepared at Apothecaries' Hall. The structure of all of them is the same, but very different from that of the light carbonate before described.



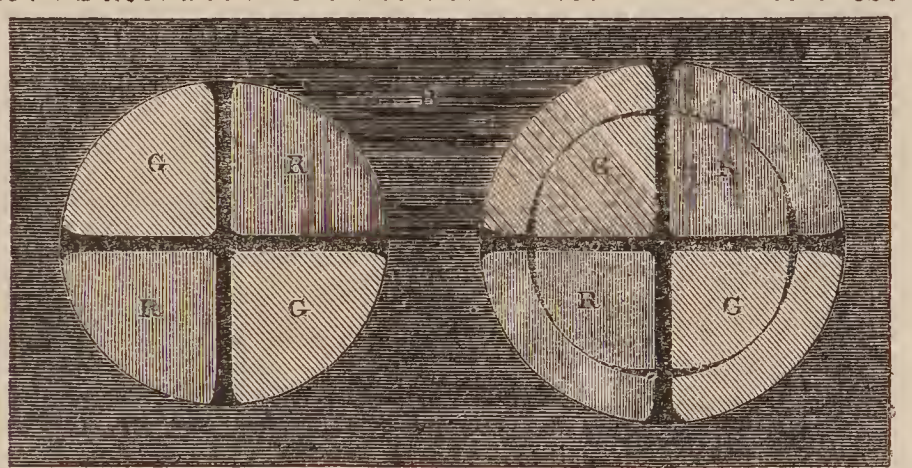
Microscopic Appearance of Heavy Carbonate of Magnesia.

Heavy carbonate of magnesia is a granular substance and contains no traces of the prismatic crystals found in the light carbonate. The granules are hard, gritty, and variable in size. Some of

Microscopic appearance of the larger Granules of Heavy Carbonate of Magnesia (more highly magnified).

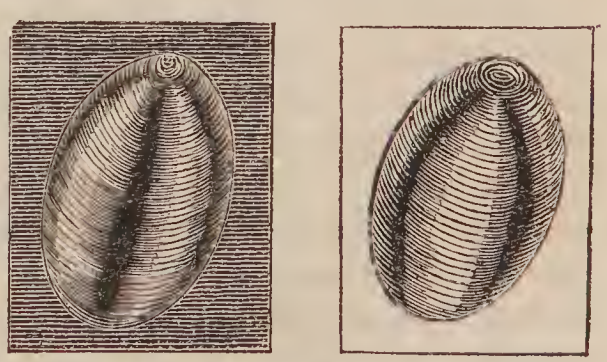
them are composed of concentric layers, each of which has a radiated structure. When examined by the polarizing microscope they are found to possess a doubly-refracting structure, and like uniaxial crystals show each a cross, either black or white, according to the position of the analyzer. When placed over a plate of selenite and examined by polarized light, the quarters or spaces between the arms of the cross are coloured: those next to each other show complimentary tints; the alternate ones the same tints. Thus, if the first quarter be green, the third quarter will be green also; but the second and fourth quarters will be red. Not unfrequently the larger granules present two or three concentric coloured rings when examined over selenite by polarized light—thus resembling the globules of carbonate of lime deposited from the urine of horses* and bullocks†, and which have been called *pearls* by Dr. A. S. Taylor on account of their structural resemblance to these bodies.

Granule of Heavy Carbonate of Magnesia, viewed by the Polarizing Microscope.



Microscopic Appearance of the Granules of heavy Carbonate of Magnesiæ when viewed by Polarized Light and with a Plate of Selenite. (The colours are indicated by the lines and the letters—B signifies *blue*, G *green*, R *red.*)

In these characters the granules closely resemble the grains of *tous les mois* (the starch of a species of Canna), which when examined by polarized light, presents the cross, and, if a plate of selenite be also employed, shows the quarters alternately of the same colours as just described.



Grains of Tous les Mois viewed by the Polarizing Microscope.

* Dr. G. Bird, *Urinary Deposits*, p 211, 1844.
† Mr. A. S. Taylor, *Lond. Med. Gaz.*, September 15th, 1848.

Heavy carbonate of magnesia is distinguished from the light variety by the complete absence of prismatic crystals and by the presence of those globular, radiated, pearl-like granules. It might be denominated by way of distinction *spheroidal* or *pearl* magnesia alba.

As far as I have been able to ascertain, the heavy carbonate is homogeneous in its nature, differing in this respect from the light carbonate, which is a mixture of two different substances. Although the granules of the heavy carbonate vary considerably in size, yet all of them are more or less spheroidal, doubly refract light, show the black cross, and present the other optical phenomena of the larger granules.

Several circumstances appear to influence the quality of magnesia alba, such as the proportions of the ingredients, the degree of dilution of the solutions, and the temperature employed. The latter, probably, is most influential. When cold solutions are employed, the bicarbonate of magnesia which is formed is slowly decomposed, and prismatic crystals are formed. But when the ebullition is used, the formation of these prismatic crystals is prevented, the excess of carbonic acid is rapidly driven off, and these globular or pearly bodies are produced, probably by the union of the neutral carbonate with the subcarbonate, or by the deposition of the one on the other.

Notwithstanding the preference usually given to the heavy carbonate for medicinal use, I am by no means satisfied of its superiority. Its smaller bulk is undoubtedly a convenience, but its more difficult solubility is a drawback to its use. If the absorption of magnesia be desired, there can be no doubt, I think, that the light is preferable to the heavy carbonate, on account of its much finer state of division, and its consequent more ready solubility in the gastro-intestinal juices.

Fritzsche* has described and figured a granular *pentahydrated four-fifth carbonate of magnesia*, 5 MgO, NCO_2, 5 HO, obtained by boiling the tabular crystals of the *pentahydrated neutral carbonate of magnesia*, MgO. CO_2, 5 HO, in water. He describes the granules as being made of concentric layers, having a radiated structure, and he has figured one having four concentric layers around the central nucleus. This structure is obviously identical with that of the heavy carbonate of magnesia of English commerce; but the granules of the latter do not usually contain so many layers.

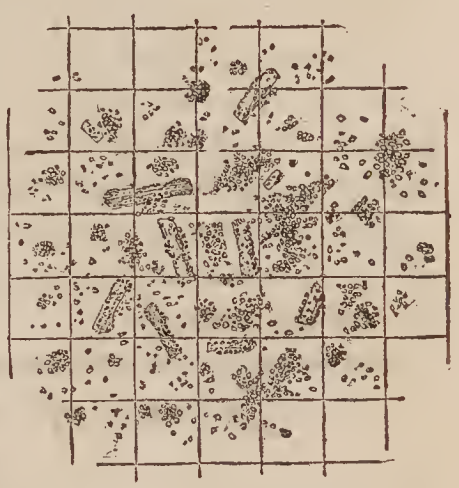
Microscopic Appearance of a Granule of the Pentahydrated neutral Carbonate of Magnesia. (Fritzsche.)

* Poggendorff's *Annalen*, xxxvii. 304, 1836.

2. OF CALCINED MAGNESIA.

Two kinds of calcined magnesia are found in English commerce, one lighter than the other, and called *common calcined magnesia*, the other termed *heavy calcined magnesia*.

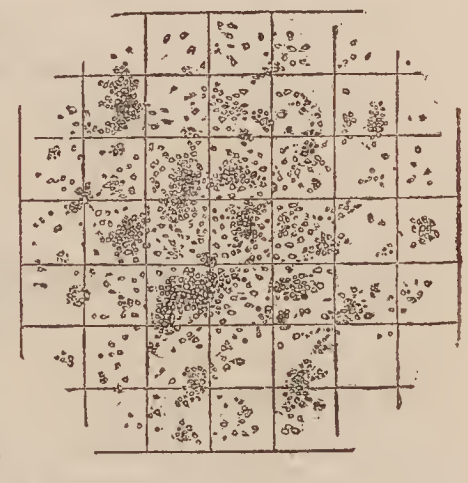
1. *Common or the less dense calcined magnesia.* — This variety of calcined magnesia is obviously prepared from the light carbonate, for on submitting it to microscopic examination, I found that, like the latter, it consisted of two substances, one amorphous, the other crystalline.



Microscopic Appearance of Light Calcined Magnesia.

The amorphous portion consists of a flocculent or minutely granular substance; the crystalline portion consists of fragments of the same kind of prismatic crystals which I have before described as characterizing the light carbonate. I find also that the operations of calcination had been imperfectly performed in all the specimens which I examined; for these crystalline fragments evolved carbonic acid when treated with hydrochloric acid.

2. *Heavy or ponderous calcined magnesia.*—This appears to me to be a homogeneous and carefully prepared substance. It contains no traces either of crystals found in both the light carbonate and light calcined magnesia, nor does it contain any of the doubly refracting globules which characterize the heavy carbonate. It appears to be entirely composed of minute granules, more or less cohering into small soft balls or masses.



Microscopic Appearance of Heavy Calcined Magnesia.

The appearances were found in Howard's heavy calcined magnesia—in the calcined magnesia prepared at Apothecaries' Hall, as well as in *Henry's calcined magnesia*.

The CHAIRMAN said there were two or three other subjects which would have been brought under the notice of the Meeting if the time had permitted, but which were unavoidably postponed until another occasion. One of these was the decomposition which had been observed in some specimens of chloroform. He had, himself, directed attention to this subject in a recent number of the *Pharmaceutical Journal*, and had stated that pure chloroform was subject to the change alluded to. It had, however, become a question, whether chloroform, in a state of absolute purity, under

went change, or whether there was some compound of a similar nature which was occasionally present in commercial chloroform, and with which the change originated. He had used the term *pure* with the intention of indicating that the chloroform which became acid possessed, previously to this change, the usual characters and properties assigned to that body. The subject was at present in some degree of obscurity, and the delay of another month would be advantageous, in allowing further time for eliciting information with reference to it.

The remainder of the evening was occupied in examining the different varieties of magnesia, alluded to in Dr. Pereira's paper, by the microscope.

MEETING OF THE DINNER STEWARDS.

September 6th, 1848.

BENEVOLENT FUND.

FINANCIAL STATEMENT.

	£	s.	d.		£	s.	d.
Dinner Tickets	137	11	0	Dinner Bill	137	7	0
Stewards' Extras	25	1	3	Music, &c. &c.	25	5	3
Donations	795	12	0	Balance	795	12	0
	£958	4	3		£958	4	3

(Signed) R. H. Pigeon, Jun., *Treasurer.*
C. C. Luckombe, *Auditor.*
Geo. W. Smith, *Hon. Sec.*

SUPPLEMENTARY DONATIONS.

	DONATIONS. £	s.	d.
Allen, Hanburys, & Co.	5	5	0
Allen, W., Dublin	1	1	0
Blandford, W., Charlotte Street.	0	10	0
Bottle, A., Dover	1	1	0
Coles, John, Camberwell	1	1	0
Couch, W. O., Highgate	0	10	6
Crow	0	10	0
Dutton, I., Birkenhead	0	10	6
Edwards, St. Paul's Churchyard	1	1	0
Finch and Co.	1	1	0
Ford, Joseph, Wolverhampton	1	1	0
Grattan and Co., Belfast	2	2	0
Greenish, T., Dorset Square	1	1	0
Hallows, W. A., (Treasurer's Balance Sunday Closing)	1	3	0
Hudson, W. B., Haymarket	5	5	0
Jackson, T., Manchester	0	10	0
Jull, T., Braintree	1	1	0
Kelland, Greenwich	2	2	0
King, W. W., Liverpool	0	5	0
Maddocks, S., Liverpool	2	2	0
Mays, R. J. J., South Shields	0	10	6
Pickering, A., Hull	1	1	0
Pooley, John, Bath	0	10	0
Rhodes, F., Farcham	0	5	0
Rowsell, Cheapside	1	1	0
Smith and Co., Fell Street	3	3	0
Staples, Messrs., Albion	1	1	0
Swaine, Boord, and Co.	2	2	0
Taylor, W., Newport Pagnell	0	10	0
Waylett, Finsbury	2	0	0
Whitfield and Son, Worcester	5	5	0
Wilkinson, Strand	2	2	0

Resolved, "That the Donations received at the Dinner given at the Albion Hotel, on Wednesday the 16th of May, 1848, and

now amounting to the sum of £795 12*s.* be transferred, and they are hereby transferred to the Council of the Pharmaceutical Society of Great Britain, to be invested by them for the benefit and uses of the Benevolent Fund of the said Society."

(Signed) George Meggeson, *Chairman.*

MINUTES OF THE COUNCIL.

September 6th, 1848.

Resolved, "That the Thanks of the Council be given to the undermentioned Members of the Pharmaceutical Society, acting as Stewards of the Dinner given at the Albion Hotel, on Wednesday, the 16th of May, 1848, for the sum of £795 12*s.* received by them as Donations to the Benevolent Fund of this Society; and that the said amount be forthwith invested therein."

LIST OF THE STEWARDS.

Baiss, W. A.	Giles, R. B.	Orridge, B. B.
Balmer, John	Hallows, W. A.	Pedler, G. S.
Barron, Charles	Herring, Thomas	Phillips, William
Bartlett, William	Hooper, William	Pigeon, Jun., R. H.
Bell, Jacob	Horner, Edward	Redwood, T.
Blake, C. J.	Hudson, W. B.	Savory, John
Crafton, R. C.	Humpage, B.	Simkin, Edward
Davy, Charles	Ince, William	Smith, G. W.
Deane, Henry	Kelland, R.	Stamper, Ralph
Earland, John	Lescher, J. S.	Squire, Peter
Evans, John	Luckombe, C. C.	Waugh, George
Farmar, Richard	M'Cullock, William	Winstanley, E. H.
Ferris, Richard	Meggeson, George	Wilkinson, William
Foulger, Samuel	Morson, T. N. R.	Yarde, Giles
Garle, John		

ORIGINAL AND EXTRACTED ARTICLES.

ON THE PROBABILITY OF CONFOUNDING CASES OF ARSENICAL POISONING WITH THOSE OF CHOLERA.

BY H. LETHEBY, M.B.,
Lecturer on Chemistry at the London Hospital.

Most toxicologists have noticed the great similarity which exists between the symptoms which are produced by an irritant poison, especially arsenic, and those which are attendant upon an attack of cholera; so close indeed is their resemblance, and so likely are the two classes of effects to be mistaken, the one for the other, that the difficulties connected therewith have been frequently made the

ground of an advocate's defence, and the subject therefore upon which our medico-legal writers have been especially anxious to enlighten the profession; and, notwithstanding that rules have been laid down by these writers for the guidance of the medical practitioner, and that broad lines of distinction have been drawn between the two sets of symptoms in question, yet cases are constantly occurring in which the practices of the criminal are for a time hidden beneath the mask of an epidemic, or of some other prevailing malady; and I doubt not, if I may be permitted to judge from the records of our daily journals, or from the evidence which is furnished to our coroners' courts, that should cholera come among us during the existence of the present horrible mania for secret poisoning, that hundreds will be sent by a foul hand to their last account, and be buried and mourned for as the victims of God's visitation. With the view, however, of putting a check upon the murderous practices to which I have here alluded, it behoves the members of the medical profession to study and to become conversant with all the various shades of distinction which characterize the features of these two important classes of effects.

And briefly to refer to them, it may be said that in *English cholera* the attack is generally ushered in by some derangement of the digestive system—that there is commonly a looseness of the bowels of some days' duration; "and then," to quote from the graphic description of Dr. Watson, "a quantity, an enormous quantity, sometimes of a turbid, yellowish, acrid fluid, is expelled with violence both from the bowels, and by vomiting. The patients complain of a burning sensation in the epigastrium. As the vomiting and purging go on, chronic spasms of the lower extremities, and especially of the gastronemii occur; the surface of the belly is drawn up into knots, and after a while the patient, exhausted by the pain and the spasm, and still more so by the copious discharges, grows cold and faint. Sometimes actual syncope happens, and sometimes death." Death, however, is an uncommon event of this form of cholera in this country, and when it does occur, it takes place in most cases, after a period of two or three days' illness.

Asiatic Cholera is also accompanied by violent vomiting and purging, but, as in the former case, the attack is generally preceded by more or less derangement of the bowels. The matters thus ejected may be at the onset of the attack natural; but those which are discharged at a later period, have the appearance of thin gruel or rice water. At this time there is considerable thirst, with more or less pain in the throat and region of the stomach; the pulse is frequent and very feeble, often imperceptible at the wrist; the skin cold, and commonly of a dull leaden hue; the breath, lips, and tongue lose their warmth, and the latter acquire

a livid colour ; while at the same time the whole surface of the body becomes shrunk, sodden, and covered with a cold sweat ; the countenance also puts on a pinched and corpse-like appearance ; the eyes sink into their sockets, looking glassy and bloodless ; the features become sharpened, the voice husky and faint, and indeed the whole aspect is that of a being who is about to become the tenant of the grave.

But *in cases of poisoning by arsenic*, notwithstanding that many of the most prominent symptoms may be very similar to the preceding, yet there is a manifest difference in the order in which they present themselves. Thus in arsenical poisoning there is, from the first, a sensation of heat and pain in the throat, stomach, and bowels ; then comes the vomiting, and after this the diarrhœa. Again, in these cases the ejected matters are neither yellow, nor gruel-like, but they are commonly dark-coloured, and they are often streaked with blood. This is a very important symptom, for it has never yet been seen in any case of cholera. In arsenical poisoning the pain in the stomach and bowels is generally very violent, and the stage of collapse, which for the most part occurs late in the attack, is neither so sudden nor so complete in its appearance, as that which marks the severe forms of cholera, nor is there that coldness of the surface, or that blueness of the skin which is so characteristic of the latter disorder ; but when, as is often the case, the vital powers are greatly depressed, then there may be a coldness and lividity of surface which is confined almost entirely to the hands and the feet, the breath is, however, never cold, and the tongue retains its warmth and redness even to the last. Again, the features are never so ghastly as they appear in cholera ; but, on the contrary, the eyes are commonly prominent, glistening, and bloodshot, and the skin around them is often tumid, hot, and extremely sensitive.

These peculiar and distinctive signs may often serve to arouse the attention of the medical attendant, and then the chemical examination of the vomited matters will always enable him to place the nature of the case beyond every doubt.

In conclusion, as the question appears to me to be one of considerable importance, I have here drawn up a table which will exhibit at a glance the more prominent differences which have been observed between the symptoms of cholera and those of arsenical poisoning.

Symptoms of Arsenical Poisoning.	*Symptoms of Cholera.*
1. A feeling of faintness ; but no antecedent purging.	1. A feeling of discomfort not often amounting to pain in the bowels, and there is more or less purging.

2. Great pain in the stomach and bowels.

3. Vomiting — the vomited matter being dark coloured and often streaked with blood.

4. More intense pain, and a sense of burning in the stomach and bowels; great thirst and excessive purging; the stools being dark and sometimes bloody.

5. The skin is at first hot, and the circulation excited; the extremities may then become cold and livid; but the tongue retains its warmth and redness; the eyes are frequently blood-shot, and the aspect of the countenance is never so peculiarly death-like.

6. An analysis of the urine or the vomited matters will furnish the evidence of poisoning.

2. No particular pain in the stomach or bowels; but,

3. Sudden attack of vomiting and severe purging—the ejected matters being bilious, or gruel-like, never bloody.

4. Now comes the pain in the stomach and bowels, and the great thirst.

5. The skin has never been flushed or itching, but the whole surface of it has rapidly become cold and livid, the breath has lost its warmth and the tongue and lips look blue and feel cold. — The countenance pinched, the eye glazed and bloodless, and the whole aspect ghastly.

6. An analysis of the urine or vomited matter will not yield any trace of a mineral poison.

THE PREVALENCE OF DYSENTERY.

HAVING observed the recent prevalence of dysentery in the Marylebone Infirmary, and having been informed that it was also prevalent in other quarters, we publish the following table, giving the proportion of deaths from this cause during a period of seven weeks. The cases of diarrhœa and typhus are also stated, the former being allied to dysentery, while the latter disorder has been much less prevalent than usual. The average number of inmates in the workhouse is rather under 2000, of whom about 290 are patients in the infirmary, and 300 aged or convalescent.

The week ending	Dysentery	Diarrhœa.	Typhus.	Other Diseases.	Total.
September 1...	5	2	2	7	16
" 8...	7	3	0	9	19
" 15...	5	1	0	4	10
" 22...	12	1	0	10	23
" 29...	5	1	0	6	12
October 6	2	0	0	5	7
" 13	1	0	3	5	9
	37	8	5	46	96

ON THE EXISTENCE OF NITROGEN IN CHARCOAL AND COKE.

BY MR. LEWIS THOMPSON.

When a current of steam is passed over coke or charcoal placed in an iron, earthenware, or green glass tube, heated red-hot, a portion of the steam is decomposed, and carbonic acid, carbonic oxide, and hydrogen gases are liberated; it does not appear, however, that any one has yet noticed the fact that ammonia is invariably produced throughout the whole process.

I have taken every precaution to exclude atmospheric air and other sources of nitrogen, yet ammonia is constantly generated, whatever may be the kind of coke or charcoal used, nor does the ammonia form, except in proportion as the carbon is consumed by the steam, for if the experiment be continued, say for four hours, and the product set aside at the end of each hour, the first and last will afford equal quantities of ammonia. The proportion of nitrogen contained in the carbonaceous matter is too small to permit us to suppose that it is chemically combined with the whole mass of the carbon, and yet the uniform manner in which the ammonia is evolved, warrants that supposition. The presence of atmospheric air or nitrogen in the apparatus does not increase the product. The performance of this experiment is too simple to require much explanation: an iron tube containing two or three ounces of roughly powdered coke or charcoal, and placed in a furnace, has a tubulated retort luted into one of its ends, and a piece of bent glass tube into the other; as soon as the iron tube is red-hot, distilled water must be placed in the retort and boiled briskly. After the steam has blown freely for some minutes from the open end of the bent glass tube, a bottle containing diluted muriatic acid is to be placed so that the gases evolved may pass through a stratum of dilute acid four or five inches in depth. In two or three hours the acid solution may be removed and evaporated to dryness by a steam heat. The residue is impure muriate of ammonia. Plaster of Paris makes a good lute.

Byker-Bar, Newcastle-on-Tyne,
October 18th, 1848.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

ESSENCE OF CAMPHOR.

Sir,—Whatever may be the merits and acknowledged convenience of the Essence of Camphor, for which a formula appeared in the last number of your Journal, I think Dispensing Chemists (who might be disposed to adopt it on the ground of the respectable authority on which it is introduced) should be aware, that it is impossible to prepare with it a solution exactly corresponding with the Mistura Camphoræ of the Pharmacopœia.

This should contain about twenty grains of camphor, and ten minims of rectified spirit, in a pint: whereas, prepared as recommended with the essence, a pint would contain only a third the quantity of camphor, and at least twenty-four times as much spirit.

Having before occupied your space with remarks on this subject (vol. ii., page 209) I forbear at present to trespass further on your indulgence.

I am, Sir, your obedient servant,

B.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

THE REACTION OF OIL OF VITRIOL ON COD-LIVER OIL.

Sir,—Observing in the *Pharmaceutical Journal* of the present month that sulphuric acid has been proposed as a test for the purity or presence of cod-liver oil, I beg to notice that the violet tint produced by adding a few drops of the acid to it on a porcelain slab, is not peculiar to the cod, the same result is apparent by treating oil obtained from the liver of the hake (*Merlucius vulgaris*) in the same way, and doubtless from other species of the order *Malacopterygii*. I remain, Sir, your obedient servant,

Matthew Husband.

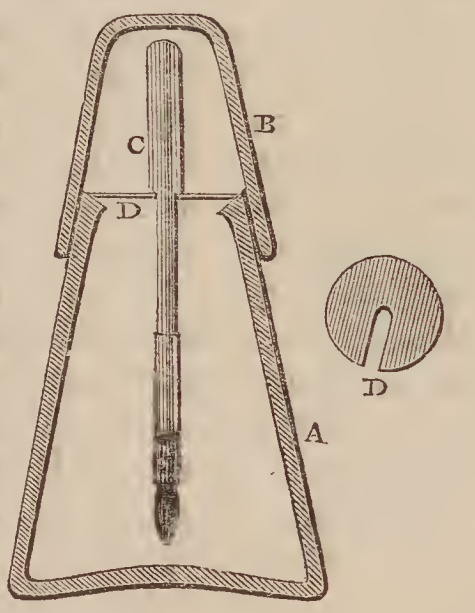
Exeter, October 7, 1848.

[We have already stated that oil of vitriol is not to be depended on as a test of the purity or genuineness of cod-liver oil. The reaction is curious, but if relied on as a test, it will mislead. We have heard the violet colour adduced as a proof of the large quantity of iodine contained in the oil, which is a fallacy.—Ed.]

OIL, GUM, OR VARNISH BOTTLE.

BY MR. C. F. BUCKLE*.

This bottle is adapted for any of those viscid fluids which are applied by means of a brush or camel's hair pencil. For paste, gum, sealing-wax, or varnish, it is a useful implement in the Chemist's shop. One of the most convenient forms of gum for labels, is dextrine, or British gum, which may be mixed with a little water in a minute. It is this preparation which is used on adhesive envelopes and postage stamps. The form of the bottle has an advantage in the application of any of these preparations, namely, that the edge below the ridge on which the disk of card rests, is sharp, so as to admit of scraping off the superfluous gum, &c., without smearing the outside of the vessel. The glass cap is useful in the case of spirit varnishes, by preventing evaporation.



A The Bottle
B Cap of do. similar to an ether bottle cap
C Brush suspended in disk of card
D Disk of card

* The bottle is designed by Mr. Buckle (at Mr. Stamper's, Leadenhall Street), and it is sold by Gilbertson of Ludgate Hill; Maw, Aldersgate Street; and other dealers in glass.

THE LIQUIDAMBER TREE OF THE TENASSERIM PROVINCES.

BY THE REV. F. MASON.

"Did you ever see in this country the tree which produces the Balsam of Tolu," a gentleman once asked the writer. "I never did," was the reply; "I have one in my compound," he continued, but unfortunately his compound was two hundred miles distant. Years passed away, and I found myself beneath this tree in flower, and soon discovered that it was not *Myrospermum toluiferum*, but *Liquidamber altingia*, and that it produced not balsam of tolu, but liquid storax.

The tree is indigenous on the coast, and in some sections is quite abundant. A considerable stream in the province of Mergué derives its name from this tree, in consequence of its growing so thick on its banks. It seems to have escaped the notice of Dr. Helfer, for if I recollect right, it is not once alluded to in any of his reports, nor has it ever been brought to notice by any one, if we except a Catholic priest, a resident of Kangoon, who has introduced it in a little Burmese medical treatise that was lithographed a few years ago by Col. Burney, who took a lithographic press with him into Burmah.

The padre seems however to have been ignorant of botany, for he describes it as the tree which produces the balsam of Peru (*Myrospermum Peruiferum*) and which belongs to a different natural family. The medicinal properties of their exudations too, are materially different. Liquid storax, the production of this tree, is described by Lindley merely as "a stimulating expectorant substance—influencing the mucous membranes, especially that which lines the air passages." The writer of the Burmese medical treatise recommends the exude of the tree for the usual purposes to which the balsam of Peru is applied, under the delusion that it is the same substance.

Here is a fine illustration of the fallacies of medicine. It is probable that this substance has been used in all the various cases many times by the author, and quite as much good done, and as wonderful cures effected, as if he had used the veritable balsam of Peru. And the same glorious effects are still being produced, for the book is in the hands of many natives, and is highly valued, but no part more so than this, because it points them to a production of the country, while most of the medicines mentioned are foreign productions.

It seems to me that our liquid storax might be made an article of commerce, but I know not how it sells in the market.

The tree is called by the Burmans *Nan-ta-rouk*.—From the *Journal of the Asiatic Society of Bengal* for June, 1848, p. 532-3.

ON AQUA-REGIA.

BY M. GAY-LUSSAC*.

Since the time of Berthollet, most Chemists have considered aqua-regia, or the mixture of nitric and hydrochloric acids in variable proportions, as composed of free chlorine and nitrous gas, held in solution by the two acids, and more particularly by the nitric acid. Berthollet also showed that chlorine and nitrous gas combine at the moment of mixture, and are subject to a considerable condensation of volume. After 50 years of silence upon this point, Edmond Davy discovered that when nitric acid is allowed to act upon common salt, a gaseous mixture is evolved of an orange-yellow colour, which contains chlorine, and another gas easily absorbable by water. He likewise pointed out the similarity of this gaseous mixture to the

* *Ann. de Chim. et de Phys.*, xxxiii. 203.

condensible compound of chlorine and nitrous gas of Berthollet, and was led by his experiments to the conclusion that the gas was composed of equal volumes of chlorine and nitrous gas, united without condensation. Baudrimont here took up the investigation, and condensed into a reddish-brown liquid, by means of a freezing mixture, the gas evolved from aqua-regia. His analysis of the compound induced him to assign it the formula

$$NO_3\ Cl_2.$$

and to substitute the name of chloronitric acid in place of chloronitrous acid, given to it by Davy. This compound was considered by Baudrimont as the active principle of aqua-regia. Notwithstanding these experiments, the majority were still in the habit of viewing aqua-regia, with Berzelius, in the same light as it was viewed by Berthollet. The composition of M. Baudrimont's compound, and the theory of its formation from the elements of aqua-regia, gave no explanation of the simultaneous production of chlorine, which was invariably observed by all who have studied this acid mixture.

M. Gay-Lussac has collected the gases evolved from aqua-regia at the temperature of boiling water; and, passing them through a cooling-mixture, has succeeded in condensing a cloudy lemon-coloured liquid, very different in appearance from a mixture of nitrous vapour and chlorine, while chlorine gas passed off.

This liquid was completely decomposed by water, without the evolution of any gas, and the solution contained hydrochloric acid, but no free chlorine. The amount of chlorine in the original gas was ascertained by precipitating the aqueous solution with nitrate of silver, and the relation which it bore to the other compound of nitrogen and oxygen was that of 2 equivs. to 1 equiv.

An analysis of the gas by means of mercury, which absorbed the chlorine, led to the same result, and confirmed the identity of the nitrogen compound with nitric oxide. The composition of the liquid is, therrefore, expressed by the formula—

$$NO_2\ Cl_2,$$

and this perfectly explains the simultaneous evolution of chlorine; 3 equivs. of oxygen, separating from an equivalent of nitric acid, give rise to 3 equivs. of chlorine, 2 of which remain in combination with the nitric oxide, and produce the new liquid acid, or *hypochloronitric acid*, while the other is liberated.

Aqua-regia, however, prepared under different circumstances, affords liquid products, which are by no means of such constant composition. When the muriatic acid of the mixture is replaced by common salt only just covered with the ordinary nitric acid of commerce, 2 equivalents of chlorine to 1.30 equivs., and in another case to 1.53 equivs. of nitric oxide were obtained from the vapour of the liquid. When gold is acted upon by aqua-regia, the nitric oxide in the mixture is reduced to somewhat less than 1 equivalent. These facts, and the different relative proportions of the two gases obtained from successive portions of the liquid, show that the body is a mixture, and that $NO_2\ Cl_2$ is not the only constituent of the chloronitric liquid. There is at least one liquid in the condensed products from aqua-regia possessing the composition shown by the formula—

$$NO_2\ Cl,$$

which latter may also be obtained directly by allowing nitric oxide and chlorine to condense together in a vessel surrounded by a cooling-mixture; but even then the product is not a definite body, for the proportions of nitric oxide gas in the less volatile portions are very much greater than in the more volatile. The same results were obtained from the vapour of the liquid condensed from a mixture of common salt with nitric acid.

These condensed liquids, prepared in different manners, are, therefore, mixtures in variable proportions of the two compounds, $NO_2 Cl_2$, and $NO_2 Cl$.

The products bear a great analogy to the hyponitric and nitrous acids, and it is proposed to call them *hypochloronitric acid* and *chloronitrous acid* respectively. They are both decomposed immediately by water, and give rise to hydrochloric acid and the products of hyponitric acid.

Aqua-regia, therefore, whether concentrated or diluted, without the agency of any other body, and simply under the influence of heat, is decomposed into chloronitric vapour, chlorine and water.

When gold is acted upon by aqua-regia, the author's experiments tend to show that the products of decomposition are precisely the same, the chlorine only being retained by the gold and the chloronitric vapour, to which the action of aqua-regia upon gold has been erroneously attributed, passing off as if no gold were concerned in the reaction.—*Quarterly Journal of the Chemical Society.*

USEFUL APPLICATION OF AMMONIACAL CHLORIDE OF ZINC.

By dissolving equal equivalents of chloride of zinc and sal ammoniac, a double salt, composed of these two substances, readily crystallizes in six-sided prisms. This salt possesses the power of dissolving oxide of copper and oxide of iron. It is, therefore, possible, by means of a concentrated solution of the ammoniacal chloride of zinc, to polish rusty spots on iron and copper. In tinning copper vessels the solution of ammoniacal chloride of zinc is of great advantage : the surface to be tinned is treated with it, and the vessel placed over a charcoal fire ; then, when the surface appears perfectly bright, the tin is poured in, so that it may spread over the surface. This method is also applicable for coating with lead.—*Pharmaceutisches Central Blatt*, No. xxvii.

ARSENITE OF QUININE.

Soubeiran, at a recent meeting of the Society of Pharmacy of Paris, stated that arsenite of quinine is now much recommended as a remedy in cutaneous diseases. He observed, that the process for preparing it, by double decomposition from sulphate of quinine and arsenite ot potash, was not a good one : he proposed the following process, which he had found to answer well :—

Take of Sulphate of quinine, 100 parts,

dissolve it in distilled water with the addition of a few drops of diluted sulphuric acid ; then precipitate the quinine with ammonia, wash it, press it, and dissolve it in

Rectified spirit, 600 parts.

Add Arsenious acid, 14.4 "

heat them together and filter. As the filtered liquor cools, the arsenite of quinine separates in acicular crystals.

ON THE CONTAMINATION OF SULPHATE OF SODA WITH SULPHATE OF MANGANESE.

Manufacturers of chloride of lime who operate on a large scale, and procure chlorine from common salt by means of sulphuric acid and the oxide of manganese, use the residue, which they probably merely saturate with lime, for the manufacture of sulphate of soda. It is obvious that

part of the neutral sulphate of the peroxide of manganese may remain in the solution and become crystallized along with the sulphate of soda. Attention has only been recently drawn to this adulteration of commercial Glauber's salt. As the sulphate of manganese possesses a similar degree of solubility in water, crystallizes in prisms like the sulphate of soda, is of a reddish white colour, and equally becomes efflorescent in dry air—the above-mentioned impurity may be easily overlooked, especially if the proportion of manganese be small. It is, therefore, advisable to examine the commercial sulphate of soda by dissolving a small quantity of it in hot water and adding to the solution a solution of chloride of lime, by which the Glauber's salt, if pure, will be neither coloured nor rendered turbid.—*Buchner's Repertorium*, Bd. i., Heft. 1., 3tte Reihe.

SALE OF THE MEDICAL TIMES AND PHARMACEUTICAL TIMES.

On Friday morning Mr. Hodgson, the auctioneer, submitted to public competition, under the order of the mortgagees in possession, the copyright and printed stock of these weekly medical journals. The former, which has been established nearly nine years, gained considerable notoriety a short time since, in consequence of a series of libellous attacks which appeared in its columns upon Mr. Wakley, the coroner, and who was at that time, and still is, the proprietor of the *Lancet*, a rival journal. In consequence of these attacks, Mr. Wakley entered several actions for libel, in all of which he was successful, and heavy damages were inflicted upon the defendant, which in all probability led to the present sale, as the auctioneer stated its receipt at this time to be such as to produce a clear income of £1000 per annum. The first offer for the entire copyright and right of continuation of the *Medical Times* was £300, which rose slowly until it reached £1,710, at which figure it was ultimately knocked down to Messrs. Tyler and Reed, the well-known printers. The *Pharmaceutical Times* was then put up, but despite of the eloquence of Mr. Hodgson, it failed to elicit one single offer, and the sale, after a considerable delay, was adjourned.—*Observer.*

UNGUENTUM STIMULANS.

Mr. Erasmus Wilson having occasion to prescribe a stimulating ointment varying in strength, according to the case for which it is required, has adopted the following, which we publish by his authority:—

℞ Pulvis Cantharidis, ℥iij.
Adipis, ℥xij.

Macerate with a moderate heat for twenty-four hours, and filter through paper.

To dilute this ointment, Mr. Wilson orders adeps odorata, by which he means ordinary pomatum.

THE CLOSING OF SHOPS ON SUNDAYS.

We have received the following Notice from Mr. Bygrave, of Chelsea, for publication:—

"Notice to the Public.—An arrangement having been entered into by the Surgeons, Chemists, and Druggists of Pimlico, Chelsea, Brompton, and surrounding neighbourhoods, to close their shops on the Sabbath days, from eleven o'clock in the forenoon until eight o'clock in the evening,

"This is to give Notice, That on and after Sunday the 29th of the present month, they will close their doors during the above-named hours, and will not supply any article, except what is *urgently required.*

"23*d October*, 1848."

A COMPLIMENTARY HINT FOR HUNGRY EDITORS!

Mr. Editor. — I beg to hand you the accompanying PRINTED CIRCULAR, which was forwarded to the Editor of a provincial paper. I think it deserving of insertion in your Journal, for the benefit of the trade generally, and remain, Yours obediently.

October 20, 1848. A M.P.S.

"Mr. H——— presents his compliments to the Editors of the ——— ——— and begs to state that he will feel obliged by their furnishing him with a copy of any number of their paper in which they may give a favourable editorial notice of his having fitted up suitable cases of medicines at 10*s.* 6*d.* and upwards, with directions, as recommended by the Board of Health, with a copy of their report; which medicines the most eminent of the faculty are of opinion that heads of families, masters of schools and workhouses, proprietors of establishments and works, such as factories, mines, warehouses, wharfs, and docks, should have for momentary use in case of an attack of cholera.

"Mr. H——— is desirous of following notices by a series of advertisements, and wishes at the same time the paper is sent, a scale of charges for advertisements."

———, *London*,
October 14*th*, 1848.

NOTICES OF BOOKS.

WORKS OF THE CAVENDISH SOCIETY.

Chemical Reports and Memoirs. Edited by Thomas Graham, V.P.R.S., Corresponding Member of the Institute of France, &c.

This is the first volume of the works of a Society which is calculated to contribute very beneficially to the advancement of chemical science in this country. We have alluded on previous occasions to the formation of the Cavendish Society, whose object is, by the association of individuals, to provide for the circulation among its members of such works of interest and value in Chemistry and its allied sciences as would not be likely otherwise to be published. Several societies of this kind, in other departments of science, have been in operation for some years, and much useful knowledge has been extended through these means. There is now a prospect of similar advantages being afforded to those who are engaged in the pursuit or application of Chemistry. It appears that the Members of the Cavendish Society at present number about 600. These, for the annual subscription of one guinea, receive all the works published by the Society, and which are not attainable in any other way. A Council elected annually by the members decide upon the books to be published,

and superintend their publication. It is estimated that should the number of members continue as at present, the funds will admit of the publication of two volumes a year; but should the subscribers increase to 900 or 1000, as we have no doubt they will, each member would receive three volumes in return for his subscription.

The active operations of the Society commence with the present year, and the second of their works, the first volume of the translation of *Gmelin's Chemistry* will be ready for circulation about the end of the year.

The volume now before us consists of "Reports and Mèmoirs" on several subjects, one or other of which cannot fail to prove interesting and instructive to the several readers for whom they are designed, whatever direction their chemical studies or pursuits may have taken.

Those who delight in physical investigations connected with the constitution of bodies, will find elaborate expositions of the present state of knowledge with reference to "The relation of the volumes of bodies in the solid state to their equivalents or atomic weights;" by Professor Otto, of Brunswick, and by M. Filhol.

It has been long ascertained, that quantities corresponding with the equivalents or atomic weights of bodies, when in the form of *gas* or *vapour*, occupy spaces which bear to each other a very simple relation, such as 1 to 2, 1 to 4, &c., and Chemists were anxious to ascertain whether the same or a similar law applied to bodies in the *solid state*. This subject has recently occupied the attention of Messrs. Playfair and Joule in this country, and several papers, describing the results of their labours, have been read before the Chemical Society, and published in the Transactions of that body. No conclusive results have yet been attained, but the investigation of the subject has led to the development of interesting facts, and afforded some points for speculation.

Somewhat allied to the foregoing subject, is that of *isomorphism*, or the relation of crystalline forms in bodies of similar constitution. On this subject there is a very excellent "Report" by Professor Otto, which has been extracted from the second edition of that author's systematic work on *Chemistry*, now in course of publication. The facts observed in reference to isomorphism admit of much more satisfactory generalization than those connected with atomic volume, and the principles that have been deduced are so interwoven with the present received systems of Chemistry, that it becomes important for Chemists to make themselves acquainted with the data upon which such principles have been founded. Professor Otto's report is considered to be the most full and detailed that has yet been published.

Those whose chemical knowledge is applied in the direction of

animal or vegetable physiology, will be gratified with the perusal of a very able and explicit report by Dr. Julius Vogel, on *Endosmosis*, or the laws according to which the mixing of fluids and their penetration into permeable substances occurs, with special reference to the processes in the human and animal organism. Increased interest has been excited in reference to this subject, by the recent publication of some researches by Liebig, on the motion of the juices in the animal body.

Those who are interested in dyeing and calico-printing will find a memoir entitled, *Physical Investigations on Dyeing*, by M. Chevreul, in which the influence that two colours may exercise upon each other, when seen simultaneously, is described in a manner calculated to interest the general reader as well as those who contemplate the special application of such knowledge. The following is the method of observing the phenomena treated of in this memoir :—

" If we look simultaneously at two narrow zones of different colour placed side by side, the colours will be more or less modified. The following is a very simple manner of convincing ourselves of this proposition. We take two bands O and O', of the same colour and identical; and two other bands, P and P', of another colour, and identical. They must be half-an-inch in width, and two and a half inches in length. They may be formed of some stuff, or of paper, or of ribbon. We then paste the band O' to a card, and put O at the distance of the $\frac{1}{20}$th of an inch, and the band P in such a manner that it shall touch O ; and finally paste on P' at the distance of $\frac{1}{20}$th of an inch from P.

" Now if we look at the card in a certain direction, and during some seconds, we shall almost always see four differently coloured bands. It must be observed that O' and P' serve as terms of comparison to judge of the modifications experienced by O and P in their juxta-position.

" Thus for instance,

Colours used in the Experiment.		Modification.
Red	inclined to	Violet
Orange	"	Yellow
Orange	"	Red
Green	"	Blue
Yellow	"	Orange
Blue	"	Indigo."

These modifications of colours are not limited to the case where the modifying coloured zones are contiguous to one another, for they may be observed even when the zones are separated.

The object of the author of this memoir has been the investigation of the laws by which these phenomena are regulated.

The sixth memoir is *On the latent Heat of Steam at different Temperatures*, by M. Regnault. This is part of a series of investigations undertaken at the instance of the French Government, with the view of elucidating the theory of the steam-engine. The subject is one of considerable importance in a practical as well as theoretical point of view. Dr. Black first directed attention to

the fact that, in the evaporation of water a great deal of heat is absorbed or rendered latent. Many experiments have since been made by different investigators with the view of determining the amount of the latent heat of steam, under the ordinary pressure of the atmosphere, and also at different pressures. The determination of the question is attended with many practical difficulties, and the results which have been obtained, have all varied to a greater or less extent.

The celebrated Watt, who was one of the earliest investigators of this subject, came to the conclusion, *that the quantity of heat necessary to convert a pound of water, at* 32° *Fahr., into steam at any pressure, is constant.* This has been called *Watt's law.*

More recently Southern and Creighton deduced from experiments which they had jointly performed, *that the heat absorbed in the transition from the liquid to the gaseous state is constant at all pressures, and that the total quantity of heat may be obtained by adding to the constant latent heat the number representing the temperature of the steam.* This has been called *Southern's law.*

These laws have pretty equally shared the sanction of philosophers, yet perfectly satisfactory experiments were wanting to give to either the full force of authority.

The experiments detailed by M. Regnault have been made with the requisite care and precautions, and the results will supersede all those which had been previously referred to. They tend to show that neither Watt's nor Southern's law is strictly in accordance with the facts ; but that of the two, the law of Watt is the nearest to the truth.

The next paper is *On the artificial Formation of Alkaloids* by M. E. Kopp, of Strasburg. The author describes the several artificial bases which are at present known, amounting to upwards of twenty. These are arranged in groups according to the modes in which they are obtained, and the re-actions which occur are described, with the view of suggesting means by which some of the more important alkaloids, which are now derived solely from natural sources, might be made artificially. The subject will interest many of the Pharmaceutical readers of the book.

The eighth and last paper is a Memoir by Professor Bunsen, *On the Pseudo-Volcanic Phenomena of Iceland.* This to the general reader is the most interesting of these reports and memoirs ; but the length to which this notice has already extended, prevents our giving an analysis of it.

The volume, as a whole, is creditable to the body from which it emanates. It contains matter of varied interest and much value, and, we doubt not, will be favourably received by the members, and contribute to the extension of the Society.

A Dispensatory, or Commentary on the Pharmacopœias of Great Britain, *comprising the Natural History, Description, Chemistry, Pharmacy, Actions, Uses, and Doses of the Articles in the Materia Medica.* By Robert Christison, M.D., V.P.R.S.E., President of the Royal College of Physicians of Edinburgh, &c., &c. Second Edition. revised and improved, with a Supplement containing the most important New Remedies. Edinburgh: A. and C. Black. London: Longmans, 8vo, pp. 1003.

[We regret the necessity of deferring our notice of this important work until next month.]

Clinical Lectures on the Practice of Medicine. By Robert J. Groves, M.D., M.R.I.A., &c., &c. Second Edition, Edited by J. Moore Neligan, M.D., M.R.I.A., &c., &c. Two volumes, 8vo, pp. 586 and 570. Dublin: Fannin and Co. London: Longman and Co. Edinburgh: Maclachlan, Stewart, and Co.

We should have been glad if we could have done justice to the author and editor of this valuable work, by giving it such a notice as it deserves; but the subject being the Practice of Medicine, it is not within the pale of our capacity.

On Pulmonary Consumption, and on Bronchial and Laryngeal Disease, *with Remarks on the Places of Residence chiefly resorted to by the Consumptive Invalid.* By Sir Chas. Scudamore, M.D., F.R.S., &c., &c. London: John Churchill, 8vo. pp. 260.

The Charleston Medical Journal and Review. Vol. III., No. 4.

Cholera Investigated. By F. Smith. W. Gibbs, Holywell-street, pp. 56.

TO CORRESPONDENTS.

H.B.—In preparing calico or linen with Collodion it is necessary to saturate it; otherwise it is absorbed, and the surface is not adhesive. Unless the gun-cotton be properly prepared, the collodion when dry sometimes crumbles into powder instead of becoming firm and tenacious. Carded cotton is the proper kind, although other similar substances may answer to a certain extent.

Peterborough.—Oiled silk is a fine description of silk saturated with drying-oil.

Ignoramus.—When decoctum cinchonæ is ordered, we use the yellow bark. It is asserted by some persons that the pale bark should be used. Any medical man who has a preference has the option of ordering the kind of bark which he intends. If he neglect to do so, the judgment of the Chemist must decide it; and considering the yellow bark the best and most commonly prescribed, we adopt it generally.

L. M. W.—For the price of chloride of zinc apply to the agents. Nitrate of lead is not in the market at present as a disinfectant.

A Chemist and Druggist.—Syrup of Poppies should be made from the capsules, not the extract.

Mr. Parr (*Nottingham*) has sent us a sample of very good test-paper of medium tint, which answers for acids or alkalies.

Y. Z.—When Oss. is ordered, it is often intended to mean f.℥viii., although, according to the Pharmacopœia, it means f.℥x.

R. B. B.—It is not illegal for any person to afford gratuitous relief to a patient in an emergency.

B. L. (*Bury*).—The subject is at this time under the notice of the Council.

An Apprentice (*near Manchester*).—See vol. vii., No. 7.

Ejus.—The subscription for Life Members of the Pharmaceutical Society is practically obsolete, not having been reduced from twenty guineas, except in the case of foreign Members, who pay ten guineas.

T.V.C. (*London*)—See vol. vii., No. 7.; apply personally to the Secretary.

J. S. C.—Friars' Balsam requires a stamp, if sold as Friars' Balsam; but not when sold as Compound Tincture of Benjamin. The other articles mentioned do not require stamps unless sold with recommendation, or the words "prepared only by."

Quæsitor.—(1.) No. 1 does not require a stamp. No. 2. does on account of the word "only."—(2.) The following is the translation: "A fourth to be taken three times a day after meals."

A. P. S. (*Dartford*)—Neither of the articles named require stamps.

An Associate (*Saffron Walden*)—The specimens of quack bills have been received, and are reserved, among others, for a future opportunity.

E. W. P., A. P. S.—Dr. Ure's *Dictionary of Chemistry* is the only book of the kind alluded to in our language. The present edition is antiquated. A new one is said to be in course of preparation.

J. F.—The preparation sold under the name of "*Dutch Drops*," is stated by Dr. Paris to be a mixture of oil of turpentine, tincture of guaiacum, spirit of nitric ether, and oils of amber and cloves.

S. F. J., Bath.—(1.) To detect mercury in plate powder, dissolve the powder in nitric acid, avoiding much excess of acid, dilute the solution, and plunge a piece of bright copper into it. The mercury will be deposited on the surface of the copper, and may be collected in globules.—(2.) *Diamond cement* is made as follows:—Soak isinglass in water until it is soft, then dissolve it in the smallest possible quantity of proof spirit, with the aid of heat. In ℥ij of this dissolve gr. x. of ammoniacum; and, while still liquid, add a solution of ℥ss. of mastic in ℥iij. of rectified spirit.

M. P. S. (*Bristol*).—We presume that *Sp. Æther. chlorici*, means what is usually sold under the name of *chloric ether*, that is a solution of one part of chloroform in eight parts of rectified spirit.

Chemist has sent some observations on the Pharmacopœia test, sulphuric acid and starch, for iodide of potassium; but he adds nothing material to what we have already stated on this subject at page 130, in the number for September. It is true that oil of vitriol would liberate iodine if added to iodide of potassium, but no Chemist would think of using the strong acid in such a case, moreover it would completely modify the action of the starch. The proper method of testing is that which we have described on previously alluding to the subject.

Chemicus.—We presume the detonating balls sold at the toy shops are made with fulminating mercury.

Collodion.—There are no other works in our language which treat more largely on the subject of analysis than those mentioned. In Fresenius's *Quantitative Analysis*, there are explicit instructions for conducting Organic Analysis.

A Student of Πειρα.—There is no better information on the subject than that contained in Dr. Pereira's book. It is true that our knowledge of the sources of the cinchona barks of commerce is not complete or satisfactory, and that would be part of the answer to the question.

A Member (*Plymouth*).—Polished steel instruments are very readily coated with gold, by dipping them into an ethereal solution of chloride of gold.

An Associate.—Mr. Youatt's work, entitled "*Sheep, their Breeds, Management, and Diseases*," is probably the kind of book required. It is published by Baldwin, Paternoster Row.

Veritas (*Coventry*).—The statement referred to will be found at vol. vi., p. 597.

Advertisements to Mr. Churchill, Princes Street, Soho.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the Editor, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. VI.—DECEMBER 1st, 1848.

THE CHOLERA.

During the past month this epidemic has made but little progress in this country. The number of cases reported and the ratio of mortality (above fifty per cent.) are sufficient to keep alive some degree of apprehension without giving rise to a panic. Although the cases have chiefly occurred among the poorer classes in unhealthy districts, there have been exceptions to this general rule, among which may be mentioned the case of Charles Brind, Esq., the late Prime Warden or Master of the Goldsmith's Company, who died at Stamford Hill, on the 12th of November, after twenty-two hours illness.

At the time our last number was in the press we were anticipating a communication from the College of Physicians, on the subject of the general precautions to be observed by the public in regard to cholera. This document appeared in the *Times* of November 3, and the opinions it contains are in many respects at variance with the instructions previously given by the legal Board of Health. The points at issue relate chiefly to diet, the College dissenting from the Board of Health in regard to the anathema which had been published against vegetables, fruits, salt meat, &c. The College gives no opinion as to the remedies to be employed or kept in readiness, observing that the treatment must depend on the circumstances of each case.

The following are the

RECOMMENDATIONS OF THE COLLEGE OF PHYSICIANS ON THE SUBJECT OF CHOLERA.

"The Royal College of Physicians of London, feeling that on the reappearance of epidemic cholera in England the public may naturally look to them for advice and guidance, have deemed it proper to appoint a cholera committee, composed of physicians who hold important offices in the metropolitan hospitals, or who had extensive experience of the disease at its last visitation, to consider what measures it is expedient to adopt with a view of preventing the spread of the disease, and of otherwise mitigating its evils.

"The committee thus formed have, in compliance with the wish of the college, drawn up the following remarks and instructions for the information of the public :—

"1. Cholera appears to have been very rarely communicated by personal intercourse ; and all attempts to stay its progress by cordons or quarantine have failed. From these circumstances the committee, without expressing any positive opinion with respect to its contagious or non-contagious

nature, agree in drawing this practical conclusion, that in a district where cholera prevails no appreciable increase of danger is incurred by ministering to persons affected with it, and no safety afforded to the community by the isolation of the sick.

"2. The disease has almost invariably been most destructive in the dampest and filthiest parts of the town it has visited. The committee would, therefore, urge on the public authorities the propriety of taking immediate steps to improve the state of sewers and drains, to cover those which are open, and to remove all collections of decaying vegetable and animal matter from the vicinity of dwellings. They would also impress on individuals, especially of the poorer classes, the great importance of well-airing their rooms, and of cleanliness in both their dwellings and persons.

"3. A state of debility or exhaustion, however produced, increases the liability to cholera. The committee, therefore, recommend all persons during its prevalence to live in the manner they have hitherto found most conducive to their health ; avoiding intemperance of all kinds, and especially the intemperate use of ardent spirits and other intoxicating liquors. A sufficiency of nourishing food ; warm clothing, and speedy change of damp garments ; regular and sufficient sleep ; and avoidance of excessive fatigue, of long fasting, and of exposure to wet and cold, more particularly at night, are important means of promoting or maintaining good health, and thereby afford protection against the cholera.

"The committee do not recommend that the public should abstain from the moderate use of well-cooked green vegetables, and of ripe or preserved fruits. A certain proportion of these articles of diet, is with most persons necessary for the maintenance of health ; and there is reason to fear, that, if they be generally abstained from, now that the potato crop has in great measure failed, many persons, especially among the poor in large towns, will fall into that ill-condition which, in its highest degree is known as scurvy, and that they will in consequence be the readier victims of cholera. The committee likewise think it not advisable to prohibit the use of pork, or bacon, or of salted, dried. or smoked meat or fish, which have not been proved to exert any direct influence in causing this disease. Nothing promotes the spread of epidemic diseases so much as want of nourishment, and the poor will necessarily suffer this want if they are led to abstain from those articles of food on which, from their comparative cheapness, they mainly depend for subsistence.

"On the whole, the committee advise persons living in districts in which cholera prevails, to adhere to that plan of diet which they have generally found to agree with them, avoiding merely such articles of food as experience may have taught them to be likely to disorder the stomach and bowels.

"4. The committee are unable to recommend an uniform plan of treatment to be adopted by the public in all cases of looseness of the bowels, supposed to be premonitory of cholera. It is, doubtless, very important that such aliments should be promptly attended to ; but since they may arise from various causes, of which a medical man can alone judge, the committee deem it safer that persons affected with them should apply at once for medical assistance, than that they should indiscriminately use, of their own accord, or on the suggestion of unprofessional persons, powerful medicines in large and frequently repeated doses. Should the looseness of the bowels be attended with feelings of great exhaustion and chilliness, the person should, of course, be placed in a warm bed, and the usual means of restoring warmth to the body be assiduously employed, until professional advice can be obtained.

"In order that the poor may have the means of obtaining such assist-

ance promptly, the committee recommend that the proper authorities should at once establish dispensaries in those parts of the town which are remote from the existing medical institutions ; and that they should also take steps to provide distinct cholera hospitals, which it will require some time to organize, and which they believe will be found to be absolutely necessary, should the epidemic prevail in this metropolis with a severity at all approaching that which it manifested on its first appearance in England. The committee wish it to be clearly understood that they do not recommend the establishment of such cholera hospitals on the ground of effecting the separation of the sick from the healthy, and of thus preventing the spread of the disease, but solely in order that, should the epidemic prove severe, proper attendance and prompt treatment may be insured for the sufferers from cholera among the poorest and most destitute class. The existing hospitals, even if the authorities should consent to the admission of persons ill of cholera, could not furnish the requisite accommodation, unless they were shut against persons labouring under other severe diseases ; a measure which, at the approach of winter especially, would add much to the distress of the poor.

"6. In conclusion, the committee would urge on the rich, who have comparatively little to fear for themselves, the great duty of generously and actively ministering to the relief of the poor while the epidemic prevails ; bearing in mind that fuel, warm clothing, and sufficient nourishment, are powerful safeguards against the disease.

"They deem it most desirable that the parish authorities should at once improve the diet and increase the comforts of the poor under their charge, and that the wealthy should form societies for the supply of food, clothing, and fuel, to those, who, though not paupers, still need charitable assistance in the present emergency.

"Such measures, which it is the duty of those possessed of power and wealth to adopt, would, the committee believe, if liberally carried out, deprive the cholera of half its victims.

"John Ayrton Paris, *President.*
"Francis Hawkins, *Registrar.*

"*College of Physicians, Oct.* 28."

The Board of Health almost simultaneously issued a document entitled—

Second Notification, *in respect to Instructions relative to Orders and Regulations.*—This is a compound of anecdote and declamation, occupying three columns of small type in the *Times*, about half of which consists of extracts of reports and statements of cases, and the remainder is an amplification of the instructions previously given. The question of contagion is adverted to, and the non-contagious doctrine which was unreservedly promulgated in the first notification is qualified by some explanatory remarks, which reduce the probabilities almost to an even balance, leaving the subject in about the same state as the Board of Health found it. These notifications are so verbose, and contain so many repetitions of the same sentiment expressed in different words, that the effect produced by reading them is less striking than it would have been if more condensation had been observed. The main feature of the document before us is the maxim that foul drains,

polluted atmosphere, dirty habits, and starvation, are favourable to the spread of cholera, and *vice versa*.

A THIRD NOTIFICATION has subsequently appeared, containing similar instructions.

We extract the following OBSERVATIONS ON CHOLERA, by DR. WILSON, from a letter in *The Lancet* of November 4 :

"I know of no means calculated to prevent or modify the atmospheric influences, on which this visitation of the Almighty depends. The cholera condition of the atmosphere appears to be irrespective of the few agencies, as yet known to man, of the air which he breathes—of its temperature and barometrical pressure—of its hygrometrical scale—of its currents, regular as the trader's wind—of its convulsions by storm and tempest. As I do not believe in any specific remedy for the disease when actually present, so I am of opinion that it cannot be prevented in those otherwise liable to it, by any special rules of medicine or of diet. The one principle that I would inculcate as preventive, under Providence, of the disease in those who are exposed to its presence, is, that they should follow their usual habits of diet, occupation, and exercise, if approved by experience as consistent with health ; that they should avoid, as at other times, all kinds of excess, and thus, awaiting the issue with calmness, that they should be at leisure to lend help to others. In the discharge of my social duty as a physician, I demur to many of the rules and suggestions enjoined, in reference to the approaching cholera, by the Government Board of Health, under date of Friday, October 6th. I am deliberately of opinion that, in a large number of individuals, inhabitants of this country, no plan of diet would be more likely to induce diarrhœa, and other varieties of 'bowel complaint,' than the exclusive bill of fare enjoined indiscriminately to Her Majesty's subjects by the Government Board of Health in the cholera *Gazette* of Friday last. Setting aside the mischievous tendency of the anti-vegetable maxims of diet recently promulgated from Gwydyr House, as directly inducing, in certain habits of body, the development of inflammatory or scorbutic disease, it is certain that, by depriving the market-gardeners and their labourers, the provision-curers, the fruiterers and fruit-venders, and many other classes of the working population, of their only means of subsistence, this ill-judged official edict, unless neutralized by the good sense of humanity, of the profession, and the public, will greatly promote and extend the ravages of the disease, already ripe in the metropolis and its suburbs.

"And this contrived aggravation of the epidemic will be in the exact degree of the financial misery which it may effect among the industrious poor, whom on the eve of winter it so rashly condemns to idleness, with all its moral and physical depression, to reduced means of lodging, fuel, food, and clothing, to worse, far worse it may be, than salt fish, 'preserved fruits,' and 'green vegetables,'—to killing cold, and utter starvation.

"All the fruits of the earth with which God, during the last summer, has blessed our orchards and gardens, are declared by the medical authorities of Gwydyr House to be, for this year, superfluous, mischievous—to have grown and ripened out of due time ! We are forbidden to enjoy them.

"*Treatment.*—No general rules (without a wide law of reserve and exception) can be laid down by any practical physician for the treatment by medicine of this rapid malignant fever, determined as it is, in most cases, by urgent symptoms of congestion, to the secreting surface of the stomach and bowels.

"I strongly deprecate the use of opium, alcoholic stimulants, and astringents, in the early stages of all cases of diarrhœa that may present themselves at this season of the year. The effect of such indiscriminate treatment, as recommended by the Government Board of Health, would be, to substitute in many instances, for a salutary moderate 'flux from the bowels,' an apoplexy, a bronchitis, or an inflammation of the lungs. Even were it possible (which it is not) to recognize in the cramps, dejections, and other incidents of 'bowel complaint,' the 'premonitory symptom,' as it is termed, of the malignant Asiatic cholera, it would be a grave question with the reflecting and experienced physician, and one only to be determined by the circumstances, in context of the case, whether, in all such instances, he should at once endeavour, by chalk, jalap, opium, and astringents, to arrest the fluid discharges from the intestinal canal.

"I have reason to believe that many persons have been preserved from the fatal congestions and collapse of the Asiatic cholera, by non-interference with the spontaneous vomiting and looseness of the bowels."

The following is an EXTRACT FROM A LEADER IN *The Lancet* of November 11:

"At the gross attempts of the Board of Health in the way of prescribing we hardly know whether to laugh or to be indignant. Poison is deliberately put into everybody's hand for free dispensation. Of one of its prescriptions the Board says—'The following, *which are within the reach and management of every one*, may be regarded as among the most useful—namely, twenty grains of opiate confection, mixed with two tablespoonfuls of peppermint water, or with a little brandy-and-water, and repeated every three or four hours, or oftener if the attack is severe.' It happens that opiate confection is a very different medicament in London, Edinburgh, and Dublin. In Edinburgh there is one grain of opium in forty-three grains of the confection; in London one in thirty-six; and in Dublin one in twenty-five. Of course the Board of Health is quite independent of Pharmacopœias. Of the above prescription the Board observes—'Half these quantities may be given to young persons under fifteen, and still smaller doses to infants.' Now, it is an undoubted toxicological fact, that infants have been killed by less than one-sixth of a grain of opium, and thrown into dangerous sopor by less than one-twelfth! Does the Board of Health meditate infanticide on a large scale? If so, it may be sure of soon rivalling Dalby and Daffy. This prescription, with others of a similar tendency, it must be remembered, was promulgated before there was a medical man in connexion with the Board. We were told that Edwin Chadwick would be a doctor in full bloom in less than ten days from the date of his appointment, but we hardly expected such a medical Crichton as we have found. It is a singular fact in this, the early history of public medicine and sanitary measures, that whenever prescriptions are issued by the Board, they are sure to be countersigned by 'Henry Austin,' a civil engineer, we believe; while, owing to the left-handed manner in which a physician has suffered himself to be added to the Board, all the regulations for street-sweeping, emptying privies, and the removal of dirt and nuisances, are signed 'Southwood Smith, M.D.'—no very flattering fact for our profession, and for this physician, in particular. A perfect transposition of functions and faculties seems to obtain at Gwydyr House.'

THE OPINION IN THE *Medical Gazette* on this subject is in accordance with the above, and confirms the sentiments which we expressed last month.

"The General Board of Health is decidedly in an unfortunate predica-

ment. Its notifications please no one, either in the profession or out of it. They possess the demerits of being lengthy, inconsistent, and contradictory. At one time they lay down a sort of national dietary, which ruins market-gardeners, and various trades. In this they are set right by the Royal College of Physicians of London. On another occasion they enter most unnecessarily into the question of contagion, and promulgate on this subject dogmatical views which are not only in opposition to the experience and observation of many medical practitioners, but are liable to give rise to great practical mischief. Then, with respect to treatment, various sorts of astringents, including the use of opiate preparations, in order to remove 'looseness of the bowels,' were specially recommended to the public, but on this general mode of prescribing, the Cholera Committee of the Royal College of Physicians wisely remark, that *they* are unable to recommend any uniform plan of treatment to be adopted in such cases. Looseness of the bowels may arise from various causes of which a medical man can alone judge; and hence 'it is safer that persons thus affected, should apply at once for medical assistance, than that they should indiscriminately use of their own accord, or on the suggestion of unprofessional persons, powerful medicines in large and frequently repeated doses.' This is the language of common sense, and it would have been at once adopted by any properly constituted Board of Health."

In the first page of our last number there is an *erratum*, "the Commissioners of Sewers" being printed instead of "the Poor-Law Commissioners." This accident arose from the fact that the functions of these and other bodies are so intermingled and exchanged that some confusion in the association of ideas was the natural result. To elucidate this confusion we need only observe, that a Board of Health is appointed, originally comprising no medical man, although one was afterwards added; and we are told on high authority that this Board is more strictly speaking a Board of Works than a Board of Health. The Poor-Law Commissioners issue a voluminous list of instructions relating to cholera, among which are contained stringent and explicit regulations respecting sewers and drains. The Commissioners of Sewers issue a circular to the Unions and Boards of Guardians (*The Times*, November 16th), calling upon them to instruct their medical officers to furnish a return of the mortality, specifying the nature of the disorder in their several districts. The College of Physicians, the body to which the public would naturally look for advice and information on such an emergency, is last in the field, and publishes an antidote after the legal Board of Health has liberally supplied the public with poison. The public is truly in a most perplexing predicament; quacks take advantage of the confusion, and denounce the doctors *en masse*, each recommending his own nostrums, and Chemists, however conscientiously they may desire to perform their duty, are in a dilemma between law and physic, the remedies ordered by the Board of Health being countermanded by the College of Physicians. In the midst of this conflict of doubts it is not surprising that some persons are actually sceptical as to the existence of cholera in the country, and we have heard it

stated to be "a job from the beginning to the end," a mere collusion of the doctors and place-hunters for selfish purposes. It cannot be denied that some of the proceedings which have taken place have been calculated to create an undue panic in the public mind, and where this is the case there is always danger of some persons going to the opposite extreme. The rational course is to pay attention to facts rather than theories, and to take a liberal discount off the statements of persons who treat of subjects which they do not understand.

REMEDIES FOR CHOLERA.

Among the remedies which have been tried in cases of cholera, we ought not to omit mentioning chloroform. This has been stated by several practitioners to have been attended with a good result. Mr. Baker (Bengal Establishment) recommends emetics. Mr. Tuson recommends a tincture of angelica, with camphor, chlorine, carbon, and ether. Others have suggested electricity, under the idea that a certain electrical state of the atmosphere has an influence in producing cholera. The government appear to have faith in smoking as a preventive, tobacco having been allowed to prisoners and others who had previously been deprived of this luxury. Mr. Joseph considers turpentine applied externally and as an enema, and followed by salines, to be the appropriate treatment. Acetate of lead is advocated in some quarters, and small doses of calomel and opium are still recommended by some practitioners, although others denounce this line of treatment. Some difference of opinion exists as to the propriety of using hot applications, Dr. Wilson being one of those who recommend cold; and cases are on record in which it is said that a liberal supply of cold water has effected a cure. Moderate bleeding is another remedy on which opinions differ; and opium in large doses (as recommended by a practitioner, quoted in our last number), is severely condemned by others. Powdered charcoal is on the list, according to the following statement quoted from *The Times*:—

"Treatment of Cholera in Russia.—*Zarndzin, Kioffe, Russia*, Oct. 1848.—'I have upwards of 300 people at work, and the cholera all around us and amongst us; sixty of my people were taken ill; but the great matter is to take the disease at the beginning, so I called them together and explained the symptoms, which are, loss of appetite, a heaviness, and a disagreeable sensation at the pit of the stomach. I immediately administered to those who were seized one glass and a half of spirits of wine in a glass of water, with four or five teaspoonfuls of powdered charcoal, and three drops of oil of mint, and the patient took violent exercise until a strong perspiration was induced, and all my patients recovered; those who were weakly I administered the charcoal to in a fresh egg, beat up

with a little water milk-warm. For myself, as an antidote, I take every morning a fresh egg beat up with a teaspoonful of charcoal; I make the charcoal from white beech, but any wood that is free from rosin will do.'"

It is impossible to collect, in our limited space, all the suggestions which have been published on this subject, which is more appropriate for a Medical than a Pharmaceutical Journal, except so far as the preparation of the remedies is concerned. Our readers are referred to several pamphlets noticed in another part of this Journal, which contain useful information and suggestions.

We simply enumerate the more prominent supposed or admitted remedies without any intention of either offering an opinion or promoting the adoption of any of these suggestions by those who are not medical practitioners. The Chemist ought to be aware what remedies have been applied or advocated. This knowledge does not imply that he is called upon to prescribe, but that he should be conversant with the general history of the subject.

It remains for the medical profession to reconcile the conflicting opinions which at present exist, and this can only be done by the accumulation of evidence—the publication of facts collected from various sources, and arranged in a statistical form by those who are competent to draw correct inferences. We are glad to hear that the College of Physicians has a committee engaged in this inquiry.

ACCIDENTAL POISONING.

The unfortunate cases of poisoning reported in another part of this number, as well as other cases of recent occurrence, which have been made public in the newspapers, have given rise to a variety of propositions of a preventive character. When an accident has occurred, it is not difficult to review the circumstances, and to point out in what manner that particular accident might have been prevented, but it is remarkably difficult in a community composed of fallible beings to lay down specific rules for the prevention of accidents in general.

The popular plan for guarding against accidental poisoning is to place all poisons under lock and key; and we are told that if these substances were kept by Chemists in a closet apart from other drugs, and accessible only under certain restrictions, the danger of accident would be almost if not entirely at an end. The relative size of the closet and the shop does not appear to enter into the calculation, although it would be found if the experiment were tried, that the shop would be little more than a closet, and the poison department about the size of an ordinary shop. Nor do the advocates of this isolation consider what must be the feelings of patients on seeing the dispenser every two or

three minutes unlock the ponderous door and enter the poison-chamber to fetch each dose of calomel, laudanum, or other medicine ordered in their prescriptions.

As long as these propositions are confined to the newspapers, they pass away as casual speculations, but when we see the principle advocated in medical journals, the subject claims some notice from those whose opinions are founded on practice rather than theory.

In the *Medical Gazette* of November 17th, a leading article is devoted to the theory of isolation, and the Editor is not satisfied even with the establishment of a "poison-closet," observing,

> "But we must go a step further than this. In our opinion such substances should be dispensed from a different counter, with different scales and measures, and under the superintendence of an assistant, to whom this duty should be specially assigned. If this plan be adopted with the more active poisons, and if the poisonous preparations be invariably kept in bottles of *coloured glass* (*e. g.* of a deep blue colour), we are satisfied that there will be no danger to life from the circumstance that a few preparations of a doubtful nature, which may or may not be regarded as poisons, are left on the shelves of the dispensary."

We may remind the author of this proposition that the number of assistants in different shops varies considerably, and the arrangements of each establishment must be regulated accordingly. In a shop where only one assistant is kept he would be always in the poison-closet. Where the business requires six or eight hands the poison manipulator would be worked off his legs, while the other young men were doing nothing but urging him to be as quick as possible, each complaining that his customer was impatient. The blue bottle precaution is a fallacy, for all blue bottles being alike in colour, while their contents differ in properties, a mistake between two blue bottles might be as dangerous as any other mistake. In fact the opacity of the bottles would remove one safeguard against accident, by concealing the colour and appearance of the several medicines.

In an establishment were there are several assistants, some classification of labour is indispensable ; for instance, the infusions and decoctions, the store pills, the wholesale orders, the weighing of articles in packets, the patent medicines, &c., may form separate departments. In some shops the retail business is distinct from the dispensing, and one person is appointed to inspect personally every prescription which is prepared. Other methods of classification might be mentioned, but poisons pervade the whole, down to the lowest department, which consists in weighing up small parcels. Even the Editor of the *Medical Gazette* observes, "Many Druggists wisely keep arsenic, already weighed in packets and properly labelled." This remark alone proves the difficulty of enacting any practicable regulations to suit all

cases, for in London, many (we believe most) Chemists refuse to sell arsenic under any circumstances except by order of a medical man. In country-towns it is not uncommon for a Chemist to sell on a market-day half a hundred-weight of arsenic, besides a large quantity of corrosive sublimate to the farmers, who use these poisons as an application for sheep, and for other agricultural purposes.

Those who propose to legislate for the prevention of accidental poisoning should spend a week in a Chemist's shop—and not in one shop only, but in one of each class, large and small, comprising town and country houses, retail and dispensing, semi-wholesale and mixed businesses, and after six months occupied in this investigation, we should be glad to hear their opinion respecting the poison-closet, the packets of arsenic, the blue bottles and the one unfortunate assistant with his different scales and measures!

Having expressed dissent from advice which is merely theoretical, it may be expected that we should offer some suggestions of a practical or rather practicable nature. In the first place we may observe that to prevent mistakes or accidents altogether, is impossible. There is not a man living, whether he be a statesman, a doctor, an engineer, a chemist, or in any other sphere of life, who can assert that he never made a mistake or had an accident. As long as men are human beings they will be fallible. Nevertheless much may be done to diminish the chances of accident, and we would suggest in the first place that every person before commencing business as a Chemist and Druggist should pass an examination. It is childish to talk about regulating the arrangement of Chemist's shops, and establishing poison-closets, while any grocer, draper, huxter, or general dealer, can dub himself a Chemist, adopting a *blue bottle* as his diploma, and dealing out poisons with grocery, mouse-traps, and candles. The first step to be taken is to guard against poisoning from ignorance.

This being effected so far as may be found practicable, by means of an Act of Parliament for regulating the qualification of Chemists and Druggists, we may next consider the arrangements of the shop or dispensary. Among the more prominent suggestions, we may offer the following:

1st. The most active poisons, which are used in very small quantities, should be, as they always are, kept in very small bottles, and consequently in that part of the establishment appropriated to very small bottles.

2d. Tinctures, waters, extracts, syrups, wines, pills, ointments, &c., may be, for convenience, severally arranged alphabetically. There is no advantage in expelling tincture of opium, or any other

ordinary preparation, from the ranks to a distant part of the shop. On the contrary, the result would be, that instead of being placed on the shelf when used, it would continually be left on the counter, as the dispenser could not be running away from his customer every five minutes to replace the bottle in the poison closet.

3d. Preparations similar in appearance and in name, but differing in properties, should not be placed side by side : for instance, mist. camph. and tinct. camph. should be on different shelves, otherwise the word *camph.* might be observed, and the colour of the liquids being the same, the wrong bottle might be taken by mistake. Such a mistake is not so likely to occur between a simple and a compound tincture if always kept together, and no advantage therefore would result from disturbing the alphabetical arrangement in this respect.

4th. Experience dictates some classification among the several tinctures and other classes of preparations according to the extent of the demand, those seldom used being in smaller bottles and on a higher shelf. Among these bottles, some of the preparations of a powerful nature may conveniently be placed.

5th. All external applications, when sent out, should have labels pasted, not tied on : and besides the label describing the use of the article, there should be one with the words "for external application," or, where requisite, "poison," in conspicuous letters. The use of blue bottles for external remedies is adopted by some Chemists. This may be a good precaution if always adopted, but if an exception occur (a blue bottle of the right size not being at hand), then the danger is increased from the habit of depending on the colour of the bottle. The label is always at hand, and can never be misunderstood.

6th. It is important to label each bottle or pill-box before proceeding with any other prescription, and never to leave an unlabelled bottle on the counter under any circumstances. The practice of preparing several prescriptions, and writing all the labels afterwards, has occasioned serious accidents.

7th. When a prescription is prepared and the medicine labelled, the dispenser should carefully revise the prescription and compare it with the label. Pressure of business, or the impatience of customers, should not be allowed to interfere with this practice, which is the most important security against any omission or other accident.

8th. Legal Boards of Health should consult the College of Physicians before they give medical advice and recommend opium as a family medicine for general use.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

PHARMACEUTICAL MEETING,
WEDNESDAY, NOVEMBER 7th, 1848.

MR. MORSON, PRESIDENT, IN THE CHAIR.

The following papers were read :—

ON THE SUPPOSED ACTION OF MECONIC ACID AS AN ANTIDOTE IN CASES OF POISONING BY CORROSIVE SUBLIMATE.

BY MR. ALFRED ALLCHIN,
Late Assistant in the Laboratory of the Pharmaceutical Society.

Dr. Christison in his *Treatise on Poisons*, 4th edition, page 442, states that meconic acid is probably a good antidote to the poisonous effects of corrosive sublimate. This opinion appears to have been founded, partly, upon the observation of the influence exerted by opium in modifying and counteracting the effects of corrosive sublimate when introduced into the stomach, of which a remarkable instance is given at page 972 of the above work; and partly, upon a statement by Pettenkoffer, that "meconic acid has a great tendency to form very insoluble salts with the metallic oxides, particularly with the deutoxides, and above all when the acid is previously in union with a base which constitutes a soluble salt." On these grounds it is asserted that "there is little doubt that the alkaline meconates must prove valuable antidotes for corrosive sublimate."

My attention having been recently directed to this subject, in connexion with the selection of the best antidotes for the different poisons; and being unable to find any direct evidence of the antidotal effects of meconic acid, I was induced to make a few experiments with the view of determining the value of this supposed antidote. The results, although imperfect, tend to show that the opinions formed of the action of meconic acid are erroneous; and as it is very desirable to avoid placing reliance on inefficacious antidotes in cases of poisoning, I am induced to lay a statement of my experiments before the Pharmaceutical Society.

Experiment 1.—Six grains of corrosive sublimate, dissolved in half an ounce of water was given to a full-sized guinea-pig, by means of a glass syringe. The animal almost immediately exhibited signs of great uneasiness, and vomited a considerable quantity of a greenish matter. In about eight minutes after the

administration of the poison, fifteen grains of meconate of potash, dissolved in a little water, was given. This produced no apparent effect, and the dose was therefore repeated in five minutes afterwards, but the animal speedily became insensible, and died in about twenty minutes.

Experiment 2.—To another smaller guinea-pig, four grains of the poison, dissolved as before, was administered. It acted as in the previous case, and although twenty grains of meconate of potash in solution was given, death ensued in about ten minutes.

Experiment 3.—To a full grown rabbit, ten grains of meconate of mercury, suspended in half an ounce of water was given. The animal soon exhibited signs of uneasiness, with constant convulsive movements of the head and limbs, but without vomiting. In about ten hours it became violently purged, which effect continued until it died at the expiration of about fifty-six hours. The animal refused food from the commencement.

These experiments, although not so satisfactory as might be wished, leave little doubt that the poison continues to exert its influence notwithstanding the early administration of the supposed antidote; and the last experiment proves that even should the corrosive sublimate be converted into the comparatively insoluble meconate of mercury before death ensues, which I shall presently show is not probable, yet the latter salt is itself a powerful poison.

Having frequently observed that the insoluble meconates are very slowly precipitated, I was surprised to find so much stress laid by Pettenkoffer on the precipitating action of meconic acid, and the influence of opium, in counteracting the effects of corrosive sublimate, ascribed wholly to this cause. In preparing the meconate of mercury used in my third experiment, I had evidence of the fact that the decomposition of corrosive sublimate by meconate of potash takes place very slowly—I was, therefore, induced to ascertain under several circumstances, the time occupied in precipitating meconate of mercury.

To a solution of twenty grains of corrosive sublimate, in two ounces of water, at 150° F., was added eighty grains of meconate of potash dissolved in water, also at 150° F. No precipitation took place for nearly an hour. During the following twelve hours the precipitation went on slowly, and at the expiration of that time it had apparently ceased. After filtering, I applied the usual tests for mercury to the filtrate, all of which indicated the presence of a large quantity of that metal. I then tested the filtrate for meconic acid, and as might have been anticipated, from the quantity of the two salts employed, that also was found to be present in abundance.

In another experiment, I kept the mixed solutions as nearly as possible at the temperature of the human stomach—that is, about

98° to 100° F., still no precipitation took place until after the expiration of three-quarters of an hour, and it then went on slowly, so that it was not completed for six or seven hours. At the end of this time, the usual tests failed to give indications of the presence of mercury in the filtered liquor.

With the view of ascertaining the effect produced by the addition of opium to corrosive sublimate, the following experiments were made :—

1. To ten grains of bi-chloride of mercury dissolved in cold distilled water, one drachm of tincture of opium was added. Copious precipitation took place immediately ; but at the end of eighteen hours meconic acid was readily detected in the filtrate.

2. To thirty grains of opium dissolved in proof spirit, a cold solution of three grains of bi-chloride of mercury was added. As in the previous experiment, a copious precipitate was formed, but at the expiration of six hours the presence of the metal was still indicated by the usual tests.

Both these experiments were repeated with scarcely a modification of the result.

I think it may be concluded from these experiments, that neither meconic acid nor the soluble meconates can be relied on as antidotes in cases of poisoning with corrosive sublimate ; and I am induced to believe that the efficacy of opium in such cases is due, partly, to the resinous and colouring matter which it contains, with which corrosive sublimate forms an insoluble compound, and partly, to the narcotic action of the morphia, which modifies the symptoms, and in some measure alleviates the suffering produced by the poisonous salt.

27, *Coles' Terrace, Islington.*

ON THE PHYSICAL CHARACTERS OF SOME VARIETIES OF CARBONATED MAGNESIA.

BY MR. HENRY DEANE.

When Dr. Pereira pointed out to me the difference in structure between the heavy and light carbonates of magnesia, it occurred to me that their mechanical structure and the cause thereof might be rendered more intelligible by so modifying the conditions of their production, that the particles composing them should be many times larger than they are usually met with.

1. To accomplish this object I first dissolved 124 grains of sulphate of magnesia, and 95 grains of bicarbonate of soda, each in four fluid ounces of cold distilled water, mixed the solutions in a flat-bottomed glass vessel, and applied a gentle heat with a gas lamp. In a few minutes effervescence commenced, which rapidly increased with the temperature, at the same time carbonate of

magnesia began to separate, partly as a heavy powder free to move in the fluid, partly as an incrustation on the bottom and sides of the vessel, and partly as a pellicle on the surface of the fluid. Before the whole of the carbonic acid was given off, the lamp was removed, and the vessel with its contents set aside for ten hours. On a microscopical examination, the precipitate presented
a. four or five distinct structures or arrangements of crystals. The pellicle on the surface was composed of long prismatic crystals, interlacing in every conceivable direction, resembling the crystals in Dinneford's solution, as figured in Dr. Pereira's paper, page 230.
b. Small tufts of acicular or minutely prismatic crystals, radiating in every direction from a central point. The crystals composing the tufts being of different lengths, somewhat like the hairs of a penetrating brush. These appeared first immediately under the
c. pellicle, and as if attached by a few points to it. Attached to the sides and bottom of the vessel, multitudes of plano-convex bodies, nucleated and concentric, similar to those represented in the fourth figure of Dr. Pereira's paper. These bodies being attached together, formed a crust on the surface of the glass, and except where individuals were isolated, did not retain a circular form, but became more or less irregular by the deposition of crystals in the
d. interspaces. Spheroidal bodies having a radiated structure, with a nucleus, usually surrounded by one or more concentric rings, evidently of the same origin as the preceding, but presenting a different aspect from not having been formed on a flat surface.
e. Minute, round, dense, transparent granules, having a structure not readily determinable, but which evidently form the nuclei of those described under *c* and *d*. These granules appeared to be identical with the large granules found in heavy magnesia, and were probably the result of the highest temperature to which any part of the solution had been exposed, for on boiling rapidly some of the mixed solutions of sulphate of magnesia and bicarbonate of soda in a test tube over a spirit lamp, the precipitate was composed entirely of dense transparent granules, apparently identical with those above-mentioned.

On attempting to repeat the experiment, entirely different results were obtained two or three times in succession. Nothing but dense transparent granules were formed, and this proved to have resulted from my having accidentally employed, in the first instance, ten grains of bicarbonate of soda more than the equivalent proportion. When the proportions first employed were repeated, it was attended with the first results, but continuing the boiling without stirring until all the excess of carbonic acid was expelled, all the granules and tufts of acicular crystals had become concentric, and even the pellicle of crystals first formed on the surface gradually changed into radiating and partially concentric granules,

a result that, in some degree, accords with Fritzsche's observation on boiling the tabular crystals of the pentahydrated neutral carbonate of magnesia in water, alluded to by Dr. Pereira in his paper; but I have not succeeded in obtaining these concentric granules by boiling the crystals from Dinneford's bicarbonated solution in water.

Looking carefully into the structure of these crystals, and the circumstances attending their formation, I am led to consider them as modifications in arrangement of the same crystalline form, the type of which is represented in the pellicle of prismatic crystals above mentioned. The difference in arrangement and intensity of aggregation—the extreme being shown in the transparent granules—probably depending on the temperature employed, and consequently on the rapidity with which they are precipitated. For we see that on the surface of the fluid, where the temperature is lowest, the crystals are all prismatic and interlacing. Immediately under the surface of the crust, where the temperature is somewhat higher, small tufts of distinct crystals are seen. On the sides of the glass, the discoid bodies form, these having transparent nuclei, which having attached themselves to the glass form starting points for crystallization, the flat surface of the glass giving the crystals a tendency to spread faster in that direction than in any other. Then follow the spheroidal forms, nucleated or non-nucleated, as accident may determine, and which having freedom of motion in the decomposing solution, the increment takes place equally in all directions. The concentric character that many of these present is probably due, in some measure, to the particles shifting their position occasionally into portions of the fluid possessing different temperature. Lastly, as the probable result of the highest temperature, the small dense transparent granules that form the nuclei of the two preceding forms, and which, under the influence of polarized light, show the cross nearly if not quite as distinctly as those found in heavy magnesia.

Nevertheless, it may be that some of these forms are distinct salts containing different proportions of water and carbonic acid, or probably differing only in the proportions of water.

The processes given by different authorities for the preparation of dense carbonate of magnesia, are not attended by the same results in each instance.

The formula * given by Christison, on the authority of Bucholz,

* "The dense carbonate, (he says,) may be prepared by mixing boiling solutions of four parts of sulphate of magnesia in twenty-four of water, and four parts and three-quarters of carbonate of soda in fourteen of water, and afterwards boiling for some minutes."—*Christison's Dispensatory*, page 612.

contains a considerable excess of alkali, and the resulting carbonate consists of granules very much larger than those composing ordinary dense magnesia, and multitudes of them are concentric.* The average large size of the granules arising from both the solutions being hot, and the concentric character probably from the presence of excess of alkali. The process given by Pereira affords a beautiful result, very free from large granules, and exactly like the best samples of commerce.

Respecting the light magnesia, none of the processes I have met with yield a product like the light *magnesia alba* of the shops, but all afford varieties of dense or granular magnesia. The formula given in the *Pharmacopœia Londinensis* does not yield light *magnesia alba*, although the proportion of water employed is double that required to yield dense magnesia, and although the solutions are mixed cold. In both cases the precipitate is at first amorphous, and subsides with difficulty, but on the application of heat, the temperature no sooner arrives at about 180° than perfect separation is effected, and the magnesia subsides rapidly in an amorphous condition; at 190° carbonic acid begins to escape, and it is no longer amorphous but has become minutely granular; continuing the heat till ebullition commences larger granules begin to form, and as it proceeds they become more and more numerous until the whole character of the precipitate is changed, and from a very fine impalpable powder, has become a very dense and gritty one, composed almost entirely of large transparent granules. This undesirable result, however, may be obviated by brisk agitation, when the carbonic acid is evolved more speedily, and the tendency to form large granules is much lessened, if not entirely obviated. The London formula, by proper management, affords a very good article; but that by the process for light magnesia given by Dr. Christison (*Dispensatory*, page 612, line 17 from bottom) is dense, and will be gritty, or contain large granules, unless great care is taken in the management of it. It is probable that the two substances have quite a different composition, for there is a large excess of alkali employed in the formation of the latter, while the London College orders exact chemical equivalents of the salts employed.

Being unsuccessful in making light *magnesia alba* according to the formula given in books, the following series of experiments were undertaken with a view to determine the proper process, and some of the results were very remarkable :—

Experiment 2.—Six parts of sulphate of magnesia, and seven

* I found that the concentric granules in this instance were the result of boiling the mother liquor, for after mixing the hot solutions, and allowing the carbonate to subside, the mother liquor being poured off and boiled, afforded an abundance of them.

parts of carbonate of soda, both in crystals, were dissolved separately in ninety-six parts (P.L. forty parts) of distilled water at 60°, and mixed.

a. The precipitate was perfectly amorphous. A portion of this precipitate with its mother liquor, was set aside in a tall glass jar, and a horsehair suspended therein. In twelve hours the precipitate occupied two-thirds of the whole bulk of fluid, and crystals began to form on the hair and sides of the vessel in circular pearly tufts. In the course of a day or two, little pits and cracks appeared in the precipitate, the crystals on the hair and glass became more numerous, and at the end of fourteen days the precipitate was all taken up, and its place supplied by a crop of beautiful crystals on the hair and glass, leaving the liquor perfectly transparent. There was not the slightest appearance of evolution of carbonic acid gas during the whole time.

b. A portion of the same precipitate in its mother liquor, was boiled without agitation for twenty minutes ; the light and amorphous character was soon lost, it became very dense, and composed entirely of large, irregular, transparent granules*, many of them single, but for the most part aggregating in clusters of from two to six. In four or five days they showed a tendency to become concentric by fresh increments of crystals.

c. Another portion was boiled rapidly with *brisk agitation* for ten minutes. There was an abundant escape of carbonic acid. The precipitate was allowed to subside, and the mother liquor poured off; it was then well washed with boiling water, and dried on a porous slab. This product was light, but not amorphous, being in structure decidedly of the variety termed heavy or dense, but having no trace of large granules, and with little taste. Its general character was the same as that prepared with the smaller quantity of water ordered in the P.L.

d. Another portion was poured on a filter and well washed with cold water, afterwards dried. The cold water continually dissolved a small quantity, as was evident on evaporating some of the last washings on a glass. The precipitate left on the filter for a day or two became crystalline on the surface. It was placed while in the paper, on a porous slab, and dried quickly. When dry, it was hard, compact, and gritty, with traces of long crystals.

e. Some of the precipitate was placed on a filter, well washed with warm water, then boiled in a large quantity of water for twenty

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* Vide *Christison's Dispensatory*, page 611, six lines from bottom, he says, "but if the mixture be then boiled, some carbonic acid is given off by the dissolved bicarbonate, and its magnesia falls down in the same state as the precipitate occasioned in the cold." The precipitate "in the same state," falls before the liquor boils, as soon as ebullition commences it begins to assume a granular form.

minutes, with occasional stirring. It then appeared to be composed entirely of light balls or tufts of very delicate acicular crystals, without the slightest appearance of granulation, and in no way resembling dense magnesia, except that the tufts all had the property of doubly refracting light, and showed, although but faintly, the cross, and with a plate of selenite, alternate colours of red and green in the quarters. These figures, large and small, corresponded in size with the figures given and described by Dr. Pereira as characteristic of ordinary light magnesia, but there was no appearance of long crystals among them. It became compact on drying.

f. Of the mother-liquor filtered from the mixed cold solutions above-mentioned, a portion was set aside ; in twelve hours prismatic crystals, singly, and in tufts began to form, which increased in size during several days. These tufts were not circular.

g. Another portion was boiled. Immediately on the application of heat, the magnesia began to separate in streaks like a delicate milky cloud. The precipitate soon became granular, many of the granules being the $\frac{1}{200}$th of an inch in diameter, the smaller averages the $\frac{1}{1500}$th of an inch. The latter is about the size of the larger granules found in the heavy magnesia of commerce. By standing in the liquor for a few days, they had a tendency to cohere, arising probably from the presence of some soluble carbonate, for as the solution was not much disturbed during ebullition, the evolution of carbonic acid was neither free nor copious.

Experiment 3. Like quantities of sulphate of magnesia and carbonate of soda were dissolved in the same quantity of water as in the last instance, both made boiling hot and then mixed. The result was a mixture of amorphous precipitate and dense granules, many of them of large size. On standing a few days these granules formed nuclei for crystals, which soon enveloped them in a beautiful manner, while the amorphous precipitate became gradually dissolved. There was a *slight* evolution of carbonic acid when the hot solutions were first mixed, but none during the subsequent process of crystallising.

From the foregoing experiments it appears that none of them afford the common light magnesia of the shops in as much as that, even in the most successful instance (Exp. 2, *e.*) the microscopic character is essentially different. This difference is doubtless occasioned by the temperature employed. It is quite clear that, without a high temperature, the heavy kind is not produced ; and that with it, so far at least as my experiments go, however large the quantity of water employed may be, and a large quantity is indispensable for success, the other kind cannot be produced, consequently a cold method must be adopted by manufacturers to accomplish the desired end. This impression is confirmed by an

allusion to a cold method I have just read in Knapp's *Technology*, just published, vol. ii., page 445; but the mode of operating is not described. Moreover, in my experiments made with cold water, long crystals are readily formed in the mother liquor, and these not continuing to advance in parallel lines, begin to branch off at the extremities, and acquire that pestle-shaped character, for which the long crystals in common light magnesia are conspicuous. It is reasonable, therefore, to infer, that both have a similar origin.

Without an exact analysis of the results of the foregoing experiments, it is not easy to arrive at very satisfactory conclusions as to what really happens in the decompositions, and what is the constitution of the varieties of carbonates formed. With regard to the precipitate formed in cold solutions (Exp. 2) I am by no means satisfied that it is a *sub*-carbonate, and that a *bi*-carbonate is held in solution. I incline rather to the belief that the precipitate is a mono-carbonate, which in its moist state is largely soluble in cold water, and possibly much more so in the sulphate of soda solution. The constitution of the crystals into which the precipitate is resolved being a true mono-carbonate, of which I believe the formula to be $Mg\ O\ C\ O_2 + 3\ H\ O$, also favours the impression. The change from an amorphous to a crystalline form, may be effected somewhat in this way:—The carbonate in solution has a tendency to free itself from the solution in which it is held, and begins to crystallise. As the crystals form, the solution becomes minus carbonate of magnesia, and takes up a fresh portion of the amorphous precipitate; and thus the process goes on until the whole of the magnesia is crystallised as a mono-carbonate, none of the carbonic acid being lost, as it probably would be, if a bi-carbonate had been formed, and as we see it does on exposing Dinneford's solution. The ready solubility of the carbonate, when freshly precipitated, accounts for its becoming hard on drying (Exp. 2, *d.*) and for the necessity for converting it into the less soluble sub-carbonate before it can be prepared and used as an article of Materia Medica.

In consequence of the large and free escape of carbonic acid during the process of making the best kind of heavy magnesia, that substance is more likely to be found an unmixed and pure sub-carbonate. Whether or not there is any chemical difference between the large granules and the most minute, remains to be proved. When the large ones are formed, the evolution of carbonic acid is comparatively slow; whether the same quantity is given off during their formation as when it is driven off more rapidly by brisk agitation to prevent their forming, I have not been able to determine. The cause and effect are probably the same in both cases, the larger granules being formed by the more prolonged deposition of crystals, in consequence of the slower evolution of carbonic

acid. A high temperature is essential to their formation, and it matters little whether a large or small quantity of water be employed, so long as the needful conditions are attended to. The separation of magnesia that takes place on heating the filtered mother-liquor, is not in consequence of its parting with carbonic acid, but because it is less soluble in hot than in cold water.

Of the medicinal effects Dr. Pereira suggested that the heavy kinds might not be so active as the light. I am rather inclined to the same opinion, and that the more dense the magnesia is, the more unfit it becomes for medicinal use. I ground the opinion partly on the mechanical condition of the dense kind, and partly on observations made over the counter during many years. I have known many persons in the habit of using light magnesia either carbonate or calcined, on being supplied with the heavy kinds, take just as much in bulk as they did of the former, without the slightest sensible increase in effect, and afterwards complain that as it did not go so far—it was much too dear. A corresponding weight of either of the light kinds would probably have proved rather inconvenient. The poor, again, are mostly good judges of what goes furthest, with the best effect, for their money. A quarter of an ounce of common magnesia alba, for one penny, will go twice or three times as far as a quarter of an ounce of heavy magnesia at three halfpence, and for the reason that they use it by bulk and not by weight. If, weight for weight, they found the same effect, they would not long rest satisfied with the lighter kinds ; for it is a great object with them as with most others, to give that medicine to their children which occupies the smallest space. The inconvenience of the light kinds in dispensing is very great ; it is therefore very desirable to obtain a magnesia devoid of the inconveniences attending either the very light or very dense sorts. The conditions requisite to obtain this end I think the present experiments will render evident. The size of the particles as seen under the microscope, is a good test of the article being well prepared.

ANALYSIS OF THE CARBONATES OF MAGNESIA,

Described in the foregoing Paper.—Received after the Meeting.

BY J. H. GLADSTONE, PH. D.

Whilst Mr. Deane was concluding the investigations recorded in the preceding paper, he kindly placed at my disposal the best defined of the salts of carbonate of magnesia which he had formed. Having analyzed them, I subjoin the results, as both interesting in themselves and capable of throwing fresh light upon previous experiments.

Two different specimens of the concentric carbonate of magnesia, described by Mr. Deane, Exp. 1, *c.* and *d.*, were submitted to analysis. The salt was gently dried in a water-bath till uniform in weight, placed in a glass tube to which a chloride of calcium tube and potash apparatus were attached ; then decomposed by the heat of a spirit lamp, and the water and carbonic acid collected as in the usual process of organic analysis : the amount of substance remaining, of course, was that of the magnesia. Separate estimations of carbonic acid were made by Wills's method.

	First Preparation.		Second Preparation.	
Magnesia	44.5	—	44.4	—
Carbonic Acid	34.0	34.7	34.2	34.5
Water	21.4	—	20.9	—
	99.9		99.5	

These numbers accord best with those deducible from the formula 4 Mg O, 3 CO_2, 4 HO, as given below :

Magnesia	44.8
Carbonic Acid	35.7
Water	19.5
	100.0

This is certainly the composition of two subcarbonates, the analysis of which will be immediately detailed ; and it appears evident that neither of the samples of this concentric salt had been perfectly pure.

The dense transparent granules described in Exp. 1, *e*, and also in Exp. 2, *b* and *g*, proved to be a subsalt of the composition 4 Mg O, 3 CO_2, 4 HO.

	Experimental.		Calculated.
Magnesia	44.5	—	44.8
Carbonic Acid	—	35.5	35.7
Water	19.4	—	19.5
			100.0

The beautiful crystalline salt, formed in Exp. 2, *a*, having been analysed in the same manner, yielded results showing it to be a neutral carbonate of the formula Mg O, CO_2+3 HO.

	Experimental.		Calculated.
Magnesia	29.9	—	29.7
Carbonic Acid	30.6	31.9	31.6
Water	38.8	—	38.7
	99.3		100.0

I remarked that in the decomposition of this salt by heat the last particles of carbonic acid are retained with great force by the magnesia, which is not the case in decomposing the subcarbonates.

The lighter carbonate of magnesia (Exp. 2, *c.*), similar to that prepared according to the P.L., gave numbers also agreeing with those calculated from the formula, 4 Mg O, 3 CO_2, 4 HO.

		Experimental.		Calculated.
Magnesia	44.7	44.8	—	44.8
Carbonic Acid	35.0	35.0	35.3	35.7
Water	—	18.9	—	19.5
		98.7		100.0

The specimen given me of the flocculent crystalline tufts described Exp. 2, *e*, was not a good one, and the quantity being very small I obtained only one determination, *viz.* of the magnesia and water, the carbonic acid in the annexed numbers being estimated as loss.

Magnesia	45.2
Carbonic Acid	33.6
Water	21.2
	100.0

These numbers appear to point out the same formula 4 Mg O, 3 CO_2, 4 HO for this salt also. It is evidently a subcarbonate; and as upon the supposition of the precipitate formed in cold solution being a neutral carbonate, a change must have taken place in Exp. 2, *e*, carbonic acid being driven off and a subsalt precipitated; it is by no means impossible that this change may have taken place in the cold solution itself—the opinion formerly held. The fact, however, that carbonic acid is given off in Exp. 2, *c*, and the change in physical characters that the salt undergoes in boiling, decidedly favour the views propounded by Mr. Deane.

It appears, therefore, that all the well-defined varieties of the precipitated subcarbonates have the composition 4 Mg O, 3 CO_2, 4 HO, or, as it may be otherwise expressed, 3 (Mg O, CO_2 HO) +Mg O, HO—the same as that observed by Kobell in hydromagnesite; and that the variations in crystalline appearance, aggregation, &c., result merely from the external circumstances under which they are formed. Whilst the six-sided prisms, Exp. 2, *a*, are expressed by the formula Mg O, CO_2+3 HO.

Mr. Fordred said he had expected to find some allusion made either by Dr. Pereira or Mr. Deane to the means by which the dense calcined magnesia, such as is sold by Howard, might be produced. In this, however, he had been disappointed, and as no reference was made to the subject in any of the modern pharmaceutical works, excepting the new edition of Gray's *Supplement*, in which the process published by Mr. Phillips, jun., was given, he wished to inquire whether any of the members present could throw any light upon it.

Mr. Deane believed that heavy calcined magnesia was the result of the calcination of the heavy carbonate.

The Chairman had no doubt that the dense carbonate of magnesia, when calcined, would yield a product which would be dense as compared with what was called the light calcined magnesia, but he was not certain that it would equal Henry's or Howard's heavy magnesia in density.

Mr. Redwood stated that he had not found any published process to yield so dense a product as that prepared in the manner described by Mr. Phillips, jun., in a paper published some time ago in the *Pharmaceutical Journal*. According to that process the liquor containing the salts, resulting from the decomposition of sulphate of magnesia and carbonate of soda, is evaporated to dryness; the salts, both soluble and insoluble, are then calcined together, and the soluble portion subsequently dissolved out. He (Mr. R.) ascribed the superior density of the magnesia obtained in this way to the influence of the sulphate of soda during the process of calcination. There were other cases in which a similar effect was found to ensue under such circumstances.

A Member observed that he had been accustomed to prepare heavy calcined magnesia from the light carbonate by merely exposing it to a very strong heat for a lengthened period.

OIL OF LAVENDER.

BY MR. JACOB BELL.

In the distillation of oil of lavender on the large scale, a considerable proportion of the stalk is not unfrequently thrown into the still with the heads of the flower. Sometimes the stalk is cut off with scissors almost close to the flower, in other cases less care is used and more stalk. The quality of the oil offered in the market varies very much, not only on account of occasional mixture with foreign oil, but even the genuine oil differs according to the circumstances under which it has been prepared.

The object of the following experiments was to ascertain to what extent the entire separation of the stalk would influence the quality of the result. The lavender florets were, therefore, stripped by hand from the stalk, which latter was carefully separated, so that nothing but the absolute floret should find its way into the still. The distillation was conducted in the usual way by steam. The quantity of water employed was about 30 gallons to the cwt. of flowers, the water coming over in each distillation being saved for the next, any deficiency being made up with fresh water.

The following table shows the quantity of flowers distilled on each of the occasions referred to, with the amount, as well as the cost, of the product from each distillation.

	Pounds of Lavender Flowers.	Oil produced.	Cost per lb.
1846.	lbs.	lb. oz.	*s.* *d.*
July 28	99	1 7	64 0
" 29	113	1 15	53 4
" 31	116	2 4	52 0
Aug. 10	89	1 4½	61 4
1847.			
July 29	110	1 7	70 0
Aug. 4	161	2 11	53 4
" 6	217	3 12	53 4
" 9	145	2 3	58 8
1848.			
July 31	255	3 0	63 0
Aug. 2	217	2 8	61 0
" 4	306	4 0	57 4
" 7	80	1 2	32 0
" 8	65	0 15	31 3

The want of uniformity in the amount of product may be in part accounted for by the greater waste which occurs in operating on small quantities, by the variation in the condition of the flowers, and also in the proportions of fresh water added to that which had been used before. The price charged for the flowers separated from the stalk varied from 9*d.* to 11*d.* a pound. In the last two experiments the lavender was obtained in bundles, and two days were occupied by several boys in stripping the flowers. The cost of the labour must, therefore, be added to the result, in order to make a fair comparison ; but even with this addition the expense is much less than it is when the flowers are bought stripped from the stalk.

The dealers will not put themselves out of their usual course unless they are well paid for their trouble; and as they are not usually called upon to supply the flowers without stalk, they seem to consider that they are conferring a favour by executing such an order, even at an exorbitant price. If the practice were more commonly adopted, arrangements would no doubt be made to supply the article on more reasonable terms.

Notwithstanding the increase in the cost of the oil obtained from the pure flowers, the improvement in the quality is sufficient to encourage a repetition of the practice. The oil is free from the rank smell which is often complained of in oil of lavender, and the experience of three years has confirmed the impression with which the experiment was undertaken. In further proof of the fact some oil was obtained by the distillation of the stalks alone, and this oil has in a remarkable degree the rank odour which is wanting in the oil from the flowers. Although this subject relates more to perfumery than to medicine, the distillation of oil of lavender is among the operations performed by the Pharmaceutical Chemist, and on the principle that whatever is worth doing is worth doing well, the above extracts from the laboratory journal are given for the purpose of establishing the fact, that

those who aim at perfection in their oil of lavender should beware of the stalks.

A few samples were on the table, namely :
The oil from the flowers without any stalk.
Ditto from the flower-heads cut off close with the scissors.
Mitcham oil as usually prepared.
And oil from the stalks without any flowers.

Mr. Waugh queried whether the increased delay in commencing the distillation of the lavender flowers, consequent upon the time occupied in picking them, as suggested by Mr. Bell, would not be productive of deterioration to an extent equal to the advantage resulting from the rejection of the stalks. He thought the more speedily the distillation was commenced after gathering the flowers, the better would the oil be.

Mr. Bell said there was a difference of opinion with reference to the point alluded to by Mr. Waugh. He knew a very good judge of oil of lavender who always distilled the dry flowers, and considered the result better when thus obtained, although the quantity of oil was not so great as when the fresh flowers were used. He thought there was no doubt as to the superiority of the oil drawn from the picked florets, and the object of his paper was, not only to direct attention to the subject, but to show what the difference in the cost of the oil was when thus prepared. It was with this latter view alone that he had stated the cost of the product of each experiment.

DECOMPOSITION IN COMMERCIAL CHLOROFORM.

The Chairman stated that, although the lateness of the hour would prevent his occupying the attention of the meeting for more than a short time, yet he was anxious to say a few words with reference to the change that some samples of chloroform underwent when exposed to light and air. It was the more necessary that he should again allude to this subject, as a short notice of his in the *Pharmaceutical Journal*, calling attention to the occurrence of decomposition, and recommending the use of a little litmus paper to detect the presence of acid, and guard against the use of impure samples, had been commented upon by some friends in Edinburgh. He read part of a letter from Dr. Christison, in which it was stated that he (Dr. C.) had not found any change to occur in the chloroform prepared in Scotland, although some of the specimens examined had been exposed to light and air for some time, and it was consequently concluded that English chloroform was different from Scotch. He (Mr. Morson) had, in the notice published in the *Pharmaceutical Journal*, incautiously used the word *pure*, in

reference to the chloroform which underwent decomposition; but in reply to Dr. Christison's remarks, he might state that his observations had not been confined to the chloroform of one maker, but of many, and that some of the specimens were of Scotch manufacture. He had taken pains to obtain samples from all the principal makers both in England and Scotland, and he had found that there was much variation in the extent and rapidity of the decomposition which took place in the Scotch as well as the English. He was by no means satisfied, however, that any one of the specimens he had seen presented the body in a state of chemical purity. The process recently published in the *Edinburgh Monthly Journal* as that adopted by a most respectable Scotch maker, was as follows: "4lbs. of chloride of lime and 12lbs. of water, are first well mixed together, and then 12 ounces of spirit added. Heat is then applied to the still (which ought not to be more than a third full) but as soon as the upper part of the still becomes warm, the heat is withdrawn, and the action allowed to go on of itself. In a short time the distillation commences, and whenever it goes on slowly, the heat is again applied. The fluid which passes over separates into two layers, the lower of which is chloroform. This, after having been separated from the weak spirit forming the upper layer, is mixed with half its measure of strong sulphuric acid, added gradually. The mixture, when cool, is poured into a leaden retort, and distilled from as much carbonate of baryta by weight, as there is of sulphuric acid by measure. The product should be allowed to stand over quick-lime for a day or two, and repeatedly shaken, and then re-distilled from the lime. The specific gravity of the resulting chloroform is generally 1.496 or 1.497." Now, this process was essentially that given by Dumas, but Soubeiran, the original discoverer of chloroform, had recently stated that for medicinal use, the purification by sulphuric acid was unnecessary, and the cost and trouble of preparation were certainly increased by it. He (Mr. M.) had not been accustomed, when he used sulphuric acid in the process of purification, to add carbonate of baryta, but he separated the acid by frequent washing with water, before distilling the chloroform. None of the authors (said Mr. M.) who have written upon the subject, have stated what the sulphuric acid does, or what it removes from the rough chloroform, yet it is evident that something is removed, for the acid assumes a dark brown or black colour. An investigation of the nature of the substance thus removed is yet wanting, and might probably throw some light upon the cause of the decomposition alluded to. It is worthy of remark, in connexion with this part of the subject, that different specimens of chloroform, made from the same materials, in the same proportions, afford different degrees of blackening with sulphuric acid. The substance

whatever it may be, which blackens with sulphuric acid, might be got rid of in great measure, if not entirely, by other means, as for instance, by carefully distilling the chloroform, in which case the residue left in the retort causes an intense blackening, while the distilled product scarcely changes the colour when added to sulphuric acid. It is by no means certain, however, that the substance which blackens with oil of vitriol is that which undergoes spontaneous change, and gives rise to the formation of free acid in chloroform. The decomposition which takes place in the production of the chloroform itself, is evidently a complicated one, and manufacturers should especially direct their attention to what occurs in this part of the process. There are several compounds, one of which, under the name of heavy muriatic ether, has been but imperfectly described or examined, which result, from the action of chlorine on alcohol, and it is probably one of these bodies that occasions the effect alluded to. In confirmation of this view of the subject, it may be mentioned, that a heavy oily liquid, obtained by one of the pupils of this institution, in endeavouring to form chloral, after being kept for some time, presents precisely the characters of the decomposed specimens of chloroform, and yet it does not blacken with sulphuric acid. The attention which has been directed to the subject will, no doubt, lead to a further investigation of the conditions under which the decomposable agent is formed, and it is to be hoped that manufacturers will be enabled to avoid its production.

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*continued*).

Elected September, October, and November.

MEMBERS.

Bromsgrove . . .	Johnson, Benjamin, High Street
Devonport	Jeffery, Moses, W., Market Street
Liverpool	Bromley, Charles, 1, London Road
"	Wearing, Richard, 1, London Road
St. Leonard's . . .	Maggs, Samuel B., 36, Marina

MAJOR EXAMINATION.

Evans, Thomas Sugden . .	60, Bartholomew Close

MINOR EXAMINATIONS.

Archer, William	Snaith
Baly, George	Warwick
Corbould, George Giles . .	Bristol

REGISTERED APPRENTICES.

APPRENTICES.	RESIDING WITH	TOWNS.
Bishop, Henry . . .	Messrs. Ferris & Co. .	Bristol
Douglass, William . .	Messrs. Wilson & Co.	Bradford
Else, William	Messrs. Jones & Co. .	Derby
Herington, Joseph . .	Mr. Martin	Guildford
Humpage, Edward . .	Mr. Humpage . . .	London
Johnson, Richard, W. D.	Mr. Barnes	Preston
Lawrence, Austin . . .	Mr. Mills	Bourn
Lawrence, George . .	Mr. Fearnley . . .	Maldon
Lowe, Henry Thomas .	Mr. Saunders . . .	London
Murray, Wm. Smith .	Mr. Wilson	Berwick
Orange, John	Mr. Griffith	Slough
Pattinson, Richard . .	Mr. Pattinson . . .	Carlisle
Radermacher, Charles J.	Mr. Mayhew . . .	Glastonbury
Robinson, Edward B. .	Mr. Barnes	Preston
Warner, John	Mr. Hooper	London
Whyncup, William . .	Mr. Coupland . . .	Harrogate
Willmott, Edwin . . .	Mr. Willmott . . .	Southwark
Yarde, Giles	Mr. Yarde	London

DINNER STEWARDS' BENEVOLENT FUND.

Herring Brothers, £10 10*s*. Mr. Jackson, 93, Cheapside, £1 1*s*.

TRANSACTIONS OF THE BRISTOL CHEMISTS' ASSOCIATION.

AUTUMN SESSION, 1848.

The following Lectures are in course of delivery at the Associations' Rooms, Tailor's Court, Broad Street:—

November 10.—An Introductory Address, Dr. G. D. Fripp.
" 18.—On Fermentation .....Mr. W. R. Giles.
December 1.—On Cholera .....Dr. Staples.
" 15.—On Endosmosis.....Mr. G. F. Schacht.

The List for the Spring Session, 1849, will be published in December.

INTRODUCTORY ADDRESS.

BY DR. G. D. FRIPP.

Gentlemen,

When, lately, I was honoured by a request, on the part of your Association, that I would open the proceedings of your second session, I hesitated greatly about undertaking the task. I felt convinced —and I say it most unaffectedly—that there were other members of my branch of the medical profession, who, while expressing their good will towards you, and encouraging your proceedings, by their sanction and co-operation, would, at the same time, have imparted valuable instruction,

and have conferred upon you the advantage of an influence, neither of which it is within my power to contribute. Even had I not distrusted my ability to prepare a formal Lecture at all deserving of your attention, upon any of the subjects bearing immediately on your valuable art,—and any other kind of subject I should have deemed inappropriate,—I have not lately had sufficient leisure at my disposal for making the attempt. Yet I could not bring myself to decline the request of your deputation, for I felt a strong desire—and this must be my apology for venturing before you, though with nothing more worthy of your notice than the desultory remarks of which this address will consist—I felt, I say, a very strong desire to testify the cordial interest I take in the efforts you are making for self-improvement, and my respect for that very important body of my fellow-workers—albeit in another department of the healing art—the Chemists and Druggists. I have, indeed, been under some slight misapprehension with regard to the constitution of your Association—though *not*, I believe, as to its general character and objects. For I had regarded it, taking for granted that such was the case, as a provincial branch of the "Pharmaceutical Society of Great Britain"—a Society, whose original formation and subsequent steady progress have given me most lively satisfaction, in the promise thereby afforded of rapid improvement in the condition of Pharmacy in this country. From a glance at your published proceedings I have learnt that this is not strictly the case. But however decided may be my own private opinion in favour of the superior advantages for the attainment of common ends, of one central association, having affiliated branches acting in complete harmony with it, over a number of wholly independent societies, I believe I shall not be wrong in addressing you as a body having in view an identity of objects with the important society I have alluded to. I infer this from the words of one of your published reports, which, in general terms, indicate these objects as consisting of *the promotion of friendly feeling among the members of your body, and the improvement of your professional education, especially that of the younger members.*

The latter of these two classes of objects, I presume to be really the first in your regard, as its paramount importance entitles it to be, although the last enumerated. And the few remarks I may offer you to-night will, accordingly, have principal reference to those objects. Yet I heartily concur in the propriety of your giving prominence, also, to the cultivation of friendly feeling; nor can I withhold the expression of my gratification at observing, that, with the manifestation of a truly enlightened sentiment, you have abstained from introducing into the enumeration of your objects, that of supporting the interests of your trade; feeling assured, as, I doubt not, you did, that these interests could not be better or more efficiently promoted than by securing the other, and the expressed objects for which you have associated yourselves. Yes, gentlemen—I repeat it—I agree with you, that the maintenance and promotion of friendly feeling among yourselves was a point well worthy your pains—well deserving a place among the ends for which you have formed yourselves into an association; for, depend upon it, that strong instinct of our nature by which man is led to seek his fellow-man, and which prompts to association, amongst those engaged in similar pursuits or placed in similar circumstances, is fraught with beneficial designs. And admirable as is a proper degree of manly self-reliance, no less desirable is the cordial recognition of the principle of mutual dependence. And just as, in the larger sphere of social existence, a man is so far a savage who does not feel and allow his connexion with and dependence upon his fellow-citizens, so, within the narrower limits of a particular calling—and more and more so in proportion as that calling implies intellect and intelligence—does he who

wraps himself up in a chilling isolation, and cynically declines to recognise a brotherhood with his compeers, deserve to be regarded as fit only for a rude and barbarous age. But in proportion as the individual members of any body are brought into contact with each other, so does a mutual attraction between them develop itself, and kindly feelings are engendered, and an honourable sentiment is begotten, supplanting those low and selfish rivalries which are based on merely selfish interests, and substituting for them a higher and more generous *esprit de corps*. And you will allow me to remind you that yours is a business demanding the recognition of these honourable and kindly sentiments. Many are the occasions for their exercise with reference to us, who have to rely upon you for so much in the exercise of our professional duties—to your more immediate customers, and to yourselves in your dealings one with another. Of how many professional secrets do you necessarily become the depositaries—how entirely is the Physician's reputation and success not unfrequently dependent on your integrity and honour, e. g., in cases where it would be impossible to bring home to your door serious or even fatal consequences that might result from some seemingly slight deviation from the conduct those principles should dictate :—how completely are the public in your hands as regards the quality of medicines, and how much might be done by an honourable understanding among yourselves to keep inferior drugs and medicines out of the market :—how greatly does the disgraceful and injurious success of quackery depend upon the extent to which you may be instrumental in supplying the public with its nostrums, and how far might a similar honourable understanding go in enabling you, as a body, without injury to your individual interests, to place a check upon its infamous career :—how often do discreditable instances of puffing and advertising occur amongst members of your calling, and other things happen which tarnish the respectability and provoke the jealousies of your body, and for all which transgressions against an honourable mode of conducting business some of the best preventions would be found in the genial influences of friendly association :—once more, how frequently must the occasions arise to each and all of you, when you are actually dependent on the existence of a disposition to render mutual accommodation.

But, while for the reasons just hinted at, I feel that you have done well and wisely in including the promotion of friendly relations among your objects, I turn with still greater satisfaction to the other ends of your Association—the improvement of your professional education, especially among your younger members. Here, gentlemen, I recognise grounds for offering you my most cordial congratulations. By associating on this principle, you place yourselves at once in relation and agreement with the spirit of the age. This spirit is eminently one of intellectual progress : and association is both a means and a sign of sharing in the general progressive tendency. There are those who look with some dread and suspicion on this kind of advancement, and who, more disposed to think well of past times than of those in which they live, depreciatingly contrast what they are pleased to call the mechanical methods of the present age, with the splendid, though rarer, individual achievements of the mighty intellects of bygone days. I neither sympathise in the fears and suspicions, nor do I agree in the objections of such persons to what must be allowed to be characteristic of the intellectual culture of our times, and what I am rather disposed to regard as a characteristic of its superiority. For, let what may of ridicule be thrown on modern organisation and mechanical procedure—on institutions, and Athenæums, and societies for advancing every individual section of human knowledge, and for making knowledge accessible to every class of the community ;—may we not

fearlessly appeal to the results of these combinations of intellectual effort, in the vast extension of knowledge and the general progress of society, as evidence of superiority over the fruits of mere solitary meditation and isolated research? Many of these objectors may well be suspected to assume their depreciatory tone as a cloak for an indolence which will not, or a stolidity which cannot participate in the onward movement. And it must be allowed that in the lives of most men there comes a time, when we are more disposed to stand by and let the stream pass on, than any longer to trust ourselves upon its surface. But surely it were as ungenerous as foolish, to attempt for this reason to stay the progress of the stream itself, or to hinder those who would, from taking advantage of its onward course. It is, then, because you, gentlemen, are wise enough on your own account, and generous enough on account of those who are just entering, or are hereafter to enter, upon their career, and for whom the seed you are sowing will bear its chief fruit, to rise above these retrograde dispositions, and, recognising the value of combination, seek to secure, through its means, for your own particular department of art and science, a participation in the general progressive tendency of the age, that I deem your efforts worthy of all support and encouragement.

But, though I might safely assume that you have satisfied yourselves by good and sufficient reasons of the desirableness of that educational improvement which you have united to promote, it may not be altogether superfluous if, with a view of strengthening and encouraging you in your laudable purposes, I give expression to what has passed through my own mind in reference to the particular *motives* which call for, and the *means* for giving effect to, your present efforts.

First, then, let me recall to your attention that your art is a scientific one, and therefore demands of those who would *intelligently* practise it, that they should be acquainted with the scientific principles on which it is based—though it is notorious that comparatively few of those hitherto occupied in it have cared to acquaint themselves, in more than a very superficial and imperfect manner, with those principles. It may, indeed, be replied, that every, even the most mechanical art, is also scientific in the same sense; that is, depending on, or related to, certain principles having reference to the properties of what is to be operated on, or of the materials employed, or to the forces developed: and yet that many arts may be successfully exercised by persons in profound ignorance of their correlative sciences. True: so long as, in the case supposed, no attempt is made to depart from what is precisely laid down as having been already derived from the science of others, or from previous fortunate empiricism. But I need scarcely observe, that in the present day of diffused intelligence, when even the common mechanic knows something of the scientific principles applying to his craft, no one in the respectable social station of those whom I am addressing—no young member of your body at least—can, without risk of being painfully reminded of his being in a false position, remain ignorant of the scientific truths connected with his immediate business. Granting even, for a moment, that the successful prosecution of your business was in no degree dependent on the increased scientific culture of which we are speaking, and supposing you (which I could only do for argument's sake) indifferent to higher considerations, such as a love of knowledge for its own sake,—I might yet appeal to a motive strong in the breasts of most men—and one which furnishes a very legitimate incentive to activity—I mean the natural desire almost every man has to raise himself in the social scale—as a reason why you should no longer be content to pursue your art in a merely mechanical manner, and to confine your attention to the details of the shop and the counter, to the neglect of the laboratory and the study. Now, though

individuals may elevate themselves, by force of unusual attainments or special endowments, above the rank usually accorded to their calling in life, yet we all know that every profession and business has a certain status attaching to it, and that this status is considered to belong to the majority of persons following any given calling. Hence the desire of all men of right feeling to maintain, and if possible to elevate, the rank of their own profession;—though it is sometimes forgotten, in the busy endeavours after extrinsic regulations and legislative protection, that the true way of attaining this end, is, for each individual member of a profession to adopt a higher standard for himself, and so to bring about that real internal elevation and improvement of the body, which will force from society at large the acknowledgment of a higher position. And if we except from comparison the professions of theology and law, and the pursuits of the banker, the merchant, and the large manufacturer, we shall find, I think, that all others take rank pretty much in proportion to the degree in which they are connected with mental attainments; and that, therefore, the true way of elevating the position of your craft, is to give it more and more of what is understood as a professional character; in other words, by connecting with its pursuit a higher standard of scientific attainment. It is thus that the Pharmacien of France has long occupied a higher position than the English Druggist. Thanks to the care of the state, which has provided that no one shall execute the responsible duties of a dispenser of medicines who is not duly qualified by the possession of all necessary knowledge, a high standard of scientific attainment has for many years distinguished the Pharmaceutical body in that country, and from its ranks many honoured names, dear to science, might be quoted. That the British Pharmaceutist may hold the same rank, it is only necessary that he should take the same course.

A second notion, akin to that I have been dwelling upon, for the movement in which you are taking part, may, I think, be supplied, by reflecting on the anomalous fact, that, while appropriating to yourselves the name of *Chemists,* you have hitherto been so in little more than name; and that not only your professional duties, but your more solid interests, might be advanced, by your being known to possess an amount of acquaintance with Chemistry in general, which should entitle you to be appealed to for chemical investigations, even though not immediately connected with medicine. But, in connexion with medicine, the applications of chemical science are daily becoming more and more recognised, and many are the investigations of this kind which the Physician would gladly have undertaken for him by competent hands, could he find such ready to serve him. And who so natural to be looked to for the purpose as he who stands in the same relation to the Physician now, as the Apothecary did of old? Why should "Chemists" be the last persons usually thought of, when a chemical inquiry is wanted? Why should all chemical questions connected with poisoning and analyses of every kind be carried to others than those whose professional cognomen would seem to indicate them as the very parties whose aid should be sought? These suggestions I venture to throw out, however, as mere hints, feeling the probability that many will, at present, consider the extension therein implied, of the province of the Pharmaceutical Chemist, wider than he would be able to make compatible with his other duties; though for myself, I am much inclined to think, that when the education of all engaged in a pharmaceutical establishment, whether apprentices, assistants, or superiors, has become what it should be, facilities will develop themselves for much more extended applications of chemical science, than now appear practicable.

The next inducement I would mention to encourage you in your laudable course of self-improvement, is, that through its means alone, can you hope to obtain those legislative restrictions—no less important to the public than to yourselves—by which untaught persons should be prevented from exer-

cising the responsible duties of dispenser of medicines. Much as we like to talk of the *paternal* duties of government, John Bull, after all, when it comes to the point, seems by no means to relish being treated as a child; but he insists upon being free to take poison if he chooses it, is excessively indignant at the idea of being kept out of harm's way, prefers that poor women in their hour of helplessness should be left to the mercies of ignorant butchers, who may drag forth their intestines through frightful rents themselves have made in their victims' bodies, and that the sufferers under all manner of diseases should be unprotected from the lying pretensions of ignorant and reckless traders upon the gullibility of mankind, rather than that the liberty of every body to do just what he likes, should be, in the slightest degree, intrenched upon. You are aware, doubtless, how utterly unprotected the whole medical profession—I should rather say the public—is, from the invasion of men professing to treat disease, who may be absolutely uneducated in any single department of medical science. No wonder, then, that hitherto, nothing has been done by the legislature to secure the community from ignorant vendors and dispensers of medicine. But we may hope for better things and more enlightened views from the public and the government, in proportion as we severally make our claims good, by spontaneously adopting a high standard of qualification within our own bodies. A most important step, therefore, was the establishment of the Pharmaceutical Society, and the determination to give a diploma to those who should exhibit satisfactory attainments on submitting themselves to certain examinations; and I heartily hope that the prestige of this diploma may soon be such as to induce all young men, designing to become Pharmaceutical Chemists, to determine upon acquiring it. It was exactly in this way that the Royal College of Surgeons in London began, and gradually won its way into public appreciation; and it is simply and solely through the consideration which has come to be attached to the possession of its diploma, that few men now dare to engage themselves in surgical practice without its sanction.

Let me now, in the next place, adduce the relations you stand in to the medical profession and to the public, as strong arguments for the improvement of your professional education. And first, with regard to your relations to the medical profession. I need scarcely say that, with few exceptions, those who give their minds to the study of disease and follow out this study in the manner which the vast extent of knowledge bearing upon it, and the solemn responsibilities of the practical Physician or Surgeon demand, can have little or no opportunity for keeping up that acquaintance with chemical and pharmaceutical science, which would enable them to be the immediate inventors of new preparations from either the vegetable or mineral kingdom. As little can they pay attention to the improvement of the various processes by which known remedies (I refer to the raw articles of the materia medica) are at present reduced into forms fitted for the use of the prescriber. For all this important aid they look rather to the professed Pharmaceutist; and it gives me great pleasure to express my grateful acknowledgments, which I am sure are but the echo of those felt by every member of my profession, to many of our own British Pharmaceutists, who have enriched our *armamentum medicaminum* with numerous most valuable contributions. I am afraid to venture upon specific allusion either to individual names or to individual preparations, as I feel that I should unwittingly do injustice to some that I might omit. Every day almost adds to the number of our obligations. And yet is there much remaining to be done. We are still greatly in want of more precise knowledge as to the best and most convenient modes of fixing the active properties of some, even of the most established, medicines. We desire more certain information as to the precise periods in the growth of many medicinal plants, when, in their several parts, their active principles are in greatest perfection. The exact influence of soil, season, and aspect, are

with respect to many of these plants, hardly yet sufficiently known Then, how much do we need improvement in the forms for exhibiting many medicines? With respect to extracts, one of the most convenient and commonly used forms of exhibition, how far are we yet from being able to place reliance upon them. It seems agreed on all hands that the directions of the Pharmacopœia—the authoritative text-book of the English Pharmaceutist—are by no means sufficient to secure even uniformity, to say nothing of absolute strength. And it has yet to be determined, I believe, what process attains these important ends most completely, and at the same time with sufficient rapidity for the purpose of general utility, whether the *in vacuo* process of Barry, or Mr. Houlton's spontaneous evaporation, or evaporation in a current of heated air, or what other. Again, the extent to which aqueous preparations of vegetable substances succeed in presenting the medicinal virtues of the drug, how far they are severally affected by temperature, and by what temperatures, how far by prolonged maceration, how they are best preserved from subsequent changes, and other allied points, may be said to be still open to much uncertainty, and to require therefore careful experiment and investigation. Now on all these subjects, and it would be easy to extend the list, we look, I say, to the Pharmaceutical Chemist for information; for such information as may be of important aid in improving the authoritative formulæ of the national Pharmacopœia, as well as be of service to the extemporaneous prescriber. As to the Pharmacopœia, it has always appeared to me that such a work can only be satisfactorily prepared by the joint labours of the Physician and the Pharmaceutist, the former determining on what substances shall be admitted as medicinal agents entitled to general confidence; the latter, for the most part, contributing the needful information as to the best "*præparata et composita*." It should be the result of a commission, constituted of certain members of the College of Physicians, and certain members of a College of Pharmacy—in other words, of the Pharmaceutical Society; and with the prospect of such an important responsibility before them, there can be little doubt that the members of the latter body would feel themselves additionally stimulated to seek out improved processes and methods. For myself, I believe, that under such a plan of procedure, the Pharmacopœia, as it appears from time to time, would not be so far behind the pharmaceutical and pharmacological science of the day as it has hitherto been. Formulæ would be inserted on the recommendation of those who know how extensively such medicines are prescribed, for the exhibition of modern remedies, now too often prescribed in uncertain doses, owing to the very absence of such authorised formulæ. And the very objectionable changes of nomenclature, which are from time to time introduced and again cancelled, to meet the fluctuating views of Chemists as to the composition of substances, would probably be successfully objected to on the part of those who could bring experience to prove their great practical inconvenience and danger. But for the Pharmaceutical body to be thus appealed to, and to enable them to stand in this position, a general elevation in their scientific character, such an one as you are now praiseworthily aiming at, may not unreasonably be required to have first taken place.

(*To be continued.*)

BIRMINGHAM PHARMACEUTICAL INSTITUTION.

The First Anniversary Meeting was held on the 3d of November, Mr. W. Southall, President, in the Chair.

A very favourable report of the progress of the Society was presented to the Meeting by the Committee. We had prepared an abstract of the report for publication, but regret that pressure of matter obliges us to defer it until next month.

ORIGINAL AND EXTRACTED ARTICLES.

ON CYANIC, CYANURIC, AND FULMINIC ACIDS.

Some observations have recently been made upon these substances which possess great importance.

Cyanic acid is a true acid oxide of cyanogen; it is formed directly by the absorption of oxygen by the cyanide of an alkaline metal exposed to a red-heat. It is also generated abundantly when cyanogen gas is brought in contact at a high temperature with an alkaline carbonate, cyanate of the oxide and cyanide of the metal being simultaneously formed. In the hydrated state, dissolved in water, this acid is exceedingly instable; its elements, feebly united among themselves and loosed from the common bond presented by the attraction of a powerful base for the body as a whole, re-act upon those of water, and rearrange themselves in the more stable forms of carbonic acid and ammonia.

Cyanuric acid, according to the views hitherto held, has the same composition per cent. both in the state of monohydrate and in that of salt, as cyanic acid; its equivalent being tripled, and the acid supposed to be tribasic, or requiring three equivalents of a metallic oxide to form a neutral compound. The properties of the acid in the free or hydrated state, present a most complete and striking contrast with those of its isomer cyanic acid in a similar condition. It forms, as is well known, hard colourless crystals, belonging to the oblique rhombic system, which contain altogether seven equivalents of water, of which four are easily expelled by spontaneous efflorescence or gentle heat. It is so stable as to resist the action of hot sulphuric and nitric acids, and requires long-continued ebullition with these powerful agents to bring about that resolution into carbonic acid and ammonia, which in cyanic acid is effected in a moment by the mere contact of cold water. Cyanuric acid is abundantly produced by the destructive distillation of urea by a high but regulated temperature: uric acid may be made to yield it, among other products, by the same method of treatment. It is produced also in several other chemical re-actions, as for example, that which takes place when the product of the destructive distillation of sulpho-cyanide of ammonium is boiled for a long time with dilute sulphuric acid.

Other relations than those of isomerism connect the cyanic and cyanuric acids, in a manner extremely interesting and instructive: —

1. Cyanate of oxide of ammonium is converted by gentle heat into urea, which is isomeric with that salt. Urea is a product of the animal economy, and a comparatively stable substance, possessing feeble basic powers.

2. Urea is decomposed by a high temperature into cyanuric acid and ammonia.

3. Cyanuric acid is by a red-heat entirely resolved into the liquid, pungent and instable hydrate of cyanic acid.

Fulminic acid has an origin totally distinct from the preceding; it arises from a remarkable action of nitric acid upon alcohol in presence of a salt of silver or mercury, and under no other circumstances yet described. It is difficult to give an exact account of what takes place

during the formation of this substance, the proportions, and perhaps the nature of the products varying with the manner in which the experiment is conducted. Besides the sparingly-soluble crystalline compound of oxide of silver or mercury, with fulminic acid, we have hyponitrous ether in large quantity, hyponitrous and oxalic acids, aldehyde, and occasionally hydrocyanic acid.

Fulminic acid is unknown in the hydrated state, and equally unknown in combination with the alkaline metals, from a peculiarity connected with its bibasic nature, which its salts possess, of only losing half the base when treated with an alkali.

According to the view commonly adopted, the relations of isomerism of these three acids are well shown by comparing their silver-salts, which exhibit the composition of the anhydrous hypothetical acids there supposed to exist:—

Cyanate of silver..... $Ag\ O,\ C_2\ N\ O$.
Fulminate of silver .....$2\ Ag\ O,\ C_4\ N_2\ O_2$.
Cyanurate of silver.....$3\ Ag\ O,\ C_6\ N_3\ O_3$.

Until quite recently, beyond identity of composition *per centum*, no relation whatever connected the second member of the above group with the other two; the origin and chemical history of fulminic acid severed it completely from the cyanic and cyanuric acids to which it was only allied by the accident of identity of composition. This is now, however, no longer the case, Mr. Gladstone* having, in some late experiments made at Giessen, succeeded in obtaining from a salt of fulminic acid both urea and hydro-sulpho-cyanic acid. The following is a notice of the process employed:—

Fulminating silver, prepared in the usual manner, was digested with water and metallic copper until completely decomposed. The soluble fulminate of copper obtained was mixed with a large excess of ammonia, whereby one-half of the oxide of copper was precipitated. Through the filtered solution of fulminate of copper and ammonia, sulphuretted hydrogen was passed until it ceased to produce a precipitate. The sulphuret of copper was separated by the filter, and the solution evaporated to a small bulk, during which a little sulphuret and sub-oxide of copper, with a grey powder, apparently sub-sulpho-cyanide of copper. The liquid then gave, in a most characteristic manner, the re-actions of urea and a sulpho-cyanide. To separate these bodies completely, the solution was warmed with a quantity of hydrated oxide of lead, until all ammonia was expelled; by this proceeding the whole of the sulpho-cyanogen was precipitated as basic sulpho-cyanide of lead, which was separated by a filter. The resulting liquid still contained a trace of copper, which was removed by a little sulphuretted hydrogen, after which the now colourless solution yielded upon evaporation crystals of urea, which converted into oxalate, and burned with chromate of lead, gave analytical results almost identical with those required by theory.

The sulpho-cyanides of lead and copper were then converted by suitable means into the silver-salt, which was subjected to analysis with the like result, leaving no doubt that sulpho-cyanide of ammonium and urea form the chief products of the re-action of sulphuretted hydrogen, or rather of sulphuret of ammonium, upon the neu-

* *Journal of the Chemical Society of London*, I., p. 228.

tral fulminate of ammonia momentarily formed by the separation of the oxide of copper from the double salt.

There is yet one other point connected with this subject which remains to be mentioned. Professor Wöhler, in a letter to Liebig, published in the May number of the *Annalen der Chemie und Pharmacie* for 1847, expresses a very decided opinion that the constitution of cyanuric acid has been to a certain extent misunderstood. No doubt can exist concerning the composition of the acid in the free state, both in crystals and in the effloresced, or dried condition. The former is represented by the formula $C_6 N_3 O_3$, 3 HO+4 HO, and the latter by $C_6 N_3 O_3$, 3 HO. This formula represents the acid to contain three equivalents of basic water, capable of replacement by a metallic oxide, as that of silver. The attempt, however, to prepare a normal anhydrous cyanurate of silver, containing 3 Ag O, $C_6 N_3 O_3$ totally failed. The most stable and definite silver-salt contained 2 Ag O, $C_6 N_3 HO_4$, and this could be heated to 390° Fah., without loss of weight or other alteration; hence it is not likely to contain water. From this and other facts Wöhler infers that cyanuric acid is really a bibasic acid, containing hydrogen, and having in its salts the formula $C_6 N_3 HO_4$, and in the crystallized state $C_6 N_4 HO_4$, 2 HO+4 HO. It is, therefore, no longer isomeric with cyanic acid, but contains the elements of three equivalents of that acid and one equivalent of water.

F.

ON THE PREPARATION OF CHARCOAL BY HEATED STEAM.

An interesting and important paper on the above-named subject has recently been published by M. Violette, director of the powder-works of Esquerdes, near St. Omer*. It appears that the kind of charcoal best fitted for the manufacture of gunpowder is that which is prepared from the wood of the *Rhamnus frangula*, at a temperature below a red-heat. In this condition it has a brown, or reddish-brown, colour, leaves a yellowish brown streak upon paper, and burns with flame when first kindled. It is quite brittle, however, easily reduced to powder, and is quite free from tarry matter. A more perfect and blacker charcoal than this *charbon roux*, makes inferior powder, being apparently more difficult of combustion.

In the ordinary processes for preparing charcoal, whether by smothered combustion in a pile, or by destructive distillation in an iron retort, a large proportion is on this account always unfit for making gunpowder, from the impossibility of so regulating the temperature as to avoid passing the proper limit of carbonization, and producing black thoroughly-burned charcoal, fit only for fuel. MM. Thomas and Laurens first conceived the idea of applying highly heated and rarefied steam to the restoration of animal charcoal which had lost its decolourizing properties, and the success of this process suggested to the author the propriety of applying the same agent to the direct carbonization of wood. The result was successful in every respect.

M. Violette first endeavoured to determine the exact limits of temperature proper for producing charcoal of the best quality, by exposing

* *Ann. Chim. et Phys.*, 3d series, xxiii. 475.

small pieces of wood to the heat of a fusible metal bath, furnished with a thermometer. Below 570° Fah., the heat was insufficient; between that temperature and 660° Fah. (the highest range of the mercurial thermometer) excellent charcoal was produced, and beyond this, overburned or black charcoal only.

The first experiments with heated steam, made by means of a small apparatus capable of containing about two pounds of wood, were so encouraging that permission was obtained to make arrangements for carrying out the process on a large scale. The apparatus now employed consists of two concentric horizontal cylinders of sheet iron, enclosed in a substantial brickwork erection, and having below a furnace whose principal office is to heat to the necessary extent the spiral coil of wrought iron pipe through which the steam is made to circulate before entering the cylinders. The outer cylinder is closed by an iron plate, which can be made tight by luting, in the manner of a coal-gas retort; and defended from the cooling influence of the air by an external cast-iron door. The charge consists of about sixty pounds of wood, which is placed in an envelope of perforated sheet iron, capable of freely entering the inner cylinder of the apparatus. The steam is admitted at a pressure of about fifteen pounds to the square inch above that of the atmosphere. After passing through the heated spiral pipe, it first enters the outer cylinder, passes through its whole length, gains access to the inner cylinder by its anterior open end, penetrates and carbonizes the wood, and finally escapes, together with the products of distillation from the latter by a tube provided for the purpose. The temperature is regulated by the aid of certain small vertical iron tubes, having their lower ends closed, which penetrate into the inner cylinder. These tubes contain portions of tin, lead, and an alloy of intermediate fusibility, by the melting of which the temperature of the cylinder is indicated with sufficient precision. The operation commonly lasts about two hours. When completed, the current of steam is stopped for a few minutes, the cylinder opened, and the perforated metal envelope containing the charcoal withdrawn, and immediately received into an iron extinguishing vessel, which is instantly closed and rendered air-tight. Without this precaution the charcoal would probably take fire on contact with the air. Another envelope, containing a fresh charge of wood, previously prepared, is then introduced into the apparatus, the cylinder closed, the steam admitted, and the operation in this manner indefinitely repeated. With moderate care and skill the product obtained consists almost wholly of *charbon roux*, absolutely free from tarry matters, and amounting to about thirty-six or thirty-eight per cent. of the weight of the wood: a quantity vastly exceeding that yielded by the old processes, which, as a mean, gave but fourteen or fifteen per cent. of the proper kind of charcoal, the rest being black from overheating, and unfit for making gunpowder.

M. Violette terminates his memoir by calling attention to several other important applications of heated steam. The waste steam which escapes from the apparatus just described, bearing with it the various products of destructive distillation of wood, is easily condensed, together with many of these latter, which differing in their nature with the stage of the operation, probably admit of being in some measure collected apart, and more easily isolated than when the whole are

mixed up together. These products would admit of being, to a certain extent, regulated by the temperature applied, which is susceptible of perfect control. The manufacture of acetic acid and wood-spirit might thus be disembarrassed from many of the difficulties which now attend it.

Bread and biscuit may be baked with the most perfect success by exposure for a very moderate time to a current of steam heated to 480° Fah. The loaves so produced are particularly sweet and well tasted, and their exposed parts covered with a gold-coloured crust very pleasing to the eye. The biscuits, by proper management, are not only well baked, but thoroughly dried, which in the preparation of biscuit for sea-stores is a point of great importance. Strange as it may at first appear, steam, in the state spoken of, is a most powerful desiccating agent, inasmuch as it has a high temperature and a condition very far removed from its condensing point. Into such an atmosphere water will evaporate with the greatest facility, since the elastic force of the vapour present is very much less than that which would be possessed by steam of the maximum tension and density proper to the temperature. High-pressure steam has already been employed to heat baking-ovens, having been made to circulate around them within an outer envelope. To gain the necessary temperature, however, steam of great elastic force must be used, the employment of which is always inconvenient and often dangerous. These evils are entirely avoided, and the process itself facilitated by the use of a current of heated and rarefied steam *within* the oven.

The desiccating powers of moderately heated dry steam might be applied to the rapid seasoning of deal and hardwood, with perhaps less injury than the heated air of a stove. In chemical manufactories the distillation of substances of difficult volatility, and upon which water has no action, might be advantageously conducted in a stream of heated vapour.

On considering the application of heated steam, described or suggested by M. Violette, it will be apparent that one of the principal difficulties to be encountered lies in the construction of the heating-spiral, and that this difficulty will increase with the temperature which may be required. At the Esquerdes powder-works, the wrought iron tube described answered very well, the steam being heated by its means to about 600° Fah. For temperatures much above this, however, there can be no doubt that the iron would be very speedily acted upon by the vapour of water, some portion of which would suffer decomposition, giving rise to hydrogen and oxide of iron. Cast-iron would probably be still more objectionable. Copper resists the vapour of water at a red heat, but is rapidly destroyed by oxidation when exposed at that temperature to the air. Perhaps a compound pipe, copper within and iron without, might be found useful. This could easily be prepared by inserting a copper tube of the proper size into a long straight piece of stout wrought-iron barrel pipe, the whole being afterwards bent cold into a spiral in the manner practised with this kind of tubing. In this manner the iron would be shielded from the action of the water, and the copper from that of the air, and the advantages of both combined. It is needless to say that the steam must not be allowed to penetrate between the two tubes.

In connexion with this subject of the action of heated steam upon

organic bodies, may be mentioned some curious observations by Mr. W. Ferguson * on the effect of steam at a temperature not exceeding 212° in apparently charring felt, which had been used for five or six months as a covering to a high-pressure boiler in which a temperature of 232° Fah. was maintained. The charring took place at places where small fissures in the boiler permitted the escape of steam, which, thus liberated, could not have a temperature exceeding 212°. Where no leaks existed, the felt in contact with the boiler remained unaltered. Another case was that presented by the wooden float-guage of a brewing-copper, which had been exposed during five years to the vapour, and the saccharine solution, at a temperature of 215° or 216° Fah. The apparently carbonized wood was found permeated by a soluble salt of copper, and the interstices were filled with octohedral and dodecahedral crystals of metallic copper, the effect of slow reduction by the organic matter. These cases, however, appear totally distinct from ordinary carbonization effected at a temperature approaching or exceeding the boiling-point of mercury, inasmuch as they required a very lengthened period of time. They more resemble the effects of those great operations of Nature in which coal and other bituminous substances have been produced by the action of water upon vegetable and other organic matter buried deep in the earth by the changes which take place upon its surface, and probably not exposed to a higher temperature than the depth at which they lie of necessity involves. The blackened and disintegrated wood and felt were probably in a condition more resembling humus than charcoal, and might have been found on examination soluble to a great extent in solution of potash. F.

ON PAPAVERINE, A NEW BASE IN OPIUM.

BY DR. GEORGE MERCK.

Opium appears to be an inexhaustible source of new substances, especially of those which possess basic properties. Five such substances have already been discovered in it, and have been established as peculiar ; and I have now succeeded in discovering, whilst examining in the laboratory at Giessen, a quantity of accumulated residues of preparations of morphia, a new basis, which I shall call *Papaverine.* I shall at present only describe the nature and chemical formula of this body.

The pure base crystallizes from spirit of wine in confused, aggregated, acicular, white crystals ; from ether they are obtained somewhat larger. In cold spirit of wine it is not easily dissolved. It is more soluble in boiling spirit, from which it crystallizes on cooling. In cold ether it dissolves but indifferently ; from a boiling solution, crystals precipitate when cold. In water it is insoluble. Slightly reddened litmus paper is rendered blue by the solution. When the crystals are treated with concentrated sulphuric acid, they become blue.

With acids, papaverine forms salts, which for the most part are difficultly soluble in water; the hydrochlorate is particularly distinguished by the facility with which it crystallizes. In somewhat diluted *hydrochloric acid,* papaverine dissolves easily, and upon an addition of more acid, at first a white precipitate is formed, which collects into drops, and forms at the bottom of the vessel an insoluble oily layer.

If left standing, crystals are formed, partly in the oily, partly in the

* *Journal of the Chemical Society of London,* I., p. 41.

supernatant aqueous liquid, which for some time augment, until the whole of the oily liquid is converted into a mass of well-shaped crystals of several lines in length. A gentle heat promotes the crystallization. The oily fluid dissolves when boiled, and separates again, for the most part, when cold. If the crystals, after having been deprived by washing with water of the adhering acid, be dissolved in boiling water, the solution when cold, remains clear, and after several days deposits large crystals. If, however, a small quantity of hydrochloric acid be added to the cold solution, the salt again separates in the above described form. The crystals of the hydrochlorate dissolve slightly in cold water, and the solution does not react upon litmus paper. Professor Kopp determined the form of the crystals of the hydrochlorate of papaverine to be right rhombic prisms, whose angles measure 80 and 100°; the more obtuse edges being sometimes slightly blunted.

Both sulphuric acid and nitric acid behave towards the base like hydrochloric acid ; but the crystals obtained are not so large.

With chloride of platinum the hydrochlorate forms a yellow precipitate, which is insoluble both in boiling water and in boiling spirit, and which could not be crystallized. The analysis of the base of the hydrochlorate and of the platinum salt lead to the following formulæ :

Papaverine.....$C_{40}\ H_{21}\ NO_8$.
Hydrochlorate of ditto.....$C_{40}\ H_{21}\ NO_8\ Cl.H$.
Platinum double salt .....$C_{40}\ H_{21}\ NO_8\ Cl.H,\ Pt\ Cl_2$.

Thus this new substance differs from the bases hitherto discovered in opium, and it is chiefly the salts and their unequal dissimilar oleaginous and crystalline nature which characterize it, and distinguished it from narcotine, to which the pure base has otherwise some resemblance.—*Annalen der Chemie und Pharm.*, April.

PREPARATION OF VALERIANIC ACID FROM OIL OF CHAMOMILE.

BY M. GERHARDT.

Oil of chamomile is assumed to consist of two proximate constituents—one a hydro-carbon, having the composition ($C_{10}\ H_{16}$), the other an oxygen compound, which is supposed to contain ($C_5\ H_8\ O$).

When oil of chamomile is boiled for a few minutes with an alcoholic solution of potash, the whole of the oxygenized constituent combines with the potash, while the hydro-carbon is merely held in solution in the spirit. On submitting the mixture to distillation, the two last-named substances distil over, leaving a potash salt, which, when decomposed with sulphuric acid, yields a volatile oily acid, possessing the odour and all the properties of valerianic acid. The identity of this product with valerianic acid was established by the following experiments :—

1. A certain quantity of the oily acid was treated with carbonate of baryta ; the soluble baryta salt thus obtained crystallized from the solution on being evaporated. The salt, after being dried at 338° to 356° Fahr., yielded a quantity of sulphate of baryta equivalent to 40.5 per cent. of barium.

2. Another portion of the acid was saturated with ammonia, and precipitated by nitrate of silver. An abundant curdy precipitate was obtained, which became crystalline after standing some time in the liquor. This salt was found to contain 51.9 per cent. of silver. The valerianate contains 51.7 per cent. of silver.—*Journal de Pharmacie.*

THE NEW BELGIAN PHARMACOPŒIA.

At a meeting of the Belgian Academy of Medicine at Brussels, on the 26th of February, 1848, at which twenty-nine members were present, it was resolved by a majority of seventeen against ten, that the Belgian Pharmacopœia shall in future be published, not in the Latin but in the French language. Two members present, who were in favonr of the Latin language, withheld their votes, as they were of the opinion that the meeting was not sufficiently represented, many Flemings, who always were in favour of the Latin language, being absent.—*Buchner's Repertorium*, Bd. i., Heft. 1, 3tte Reihe.

ON QUINOIDINE.

BY F. RODER.

Roder, an apothecary of Lenzburg, undertook a series of experiments with the view of obtaining from quinoidine, or amorphous quinine, crystallizable quinine. One part of commercial quinoidine was dissolved in four parts of spirit of wine of 30° Beck, and a solution of half a part of chloride of tin, in two parts of water added. A dark resinous mass separated. The supernatant liquid, which was only slightly coloured, was removed from the precipitate and quickly thrown down by ammonia. The precipitate was now well-washed, dried, and digested with spirit of wine, until nothing more was taken up. The united extracts were now mixed with half of the former quantity of chloride of tin, quickly precipitated with ammonia, and well washed, and the dried precipitate exhausted by spirit of wine, by which an almost colourless pure solution of quinine was obtained. This being carefully mixed with diluted sulphuric acid, yielded, by evaporation, crystals of sulphate of quinine.

In the fluid separated by filtration from the protoxide of tin, and the quinine precipitate, as well as in the washings, cinchonia was found in solution, when the quinoidine had not been purified by precipitation with an alkali. These fluids, which contained cinchonia, were precipitated by infusion of galls, in order to obtain the cinchonia in the usual way. The resinous substance which separated, still retained quinine; and, in order to extract it, the resin was dissolved in spirit of wine, again mixed with a concentrated solution of chloride of tin, and further treated in the manner above described. The resinous substance thus obtained is of a basic nature, has a bitter taste, and possesses the smell peculiar to quinoidine. It would probably yield more quinine. The author obtained by this method, from two different samples of quinoidine, once 43 per cent. of quinine, 9 per cent. cinchonia, and 28 per cent. of resin; and on another occasion 40 per cent. of quinine, 10 per cent. of cinchonia, and 30 per cent. of resin. The proportion of water in the quinoidine amounted to 20 per cent. On precipitating 100 parts of dissolved commercial quinoidine by an alkali, he obtained 69 grains of precipitate.—*Pharmaceutisches Central Blatt.*

ON THE AMALGAMATION OF IRON.

BY R. BÖTTGER.

The slight affinity between iron and quicksilver is well known. For the purpose of coating iron with quicksilver, the affinity may be increased by an electro-chemical process. Take 12 parts by weight of quicksilver, 1 part of zinc, 2 parts of sulphate of iron, 12 parts of water, and 1½ part of muriatic acid. Heat these in contact with the surface of the iron to be amalgamated. —*Buchner's Repertorium.*

ANALYSIS OF THE CHELTENHAM WATERS.

BY MESSRS. ABEL AND BROWNLEY.

	I. Cambray chalybeate spring.		II. Pitville strong saline water.		III. Sulphuretted saline water (No. 1.) Royal Old Wells.		IV. Strong saline water (No. 4.) Royal Old Well.	
	Grms. in 100 kilogr. (liters).	Grains in an imperial gallon.	Grams. in 100 kilogr. (liters.)	Grains in an imperial gallon.	Grams. in 100 kilogr. (litres.)	Grains in an imperial gallon.	Grams. in 100 kilogr. (liters.)	Grains in an imperial gallon.
Sulphate of potash	0.683	0.4781	4.216	2.9512	traces	traces	traces	traces
Chloride of potassium	7.213	5.0491	—	—	—	—	—	—
Sulphate of soda	—	—	161.238	112.8666	334.366	234.0562	135.630	94.9410
Chloride of sodium	1.734	1.2138	687.419	481.1933	328.268	229.7876	843.330	590.3310
Bromide of sodium	—	—	4.704	3.2928	—	—	—	—
Iodide of sodium	—	—	traces	traces	traces	traces	—	—
Carbonate of soda	5.981	4.1867	28.783	20.1481	—	—	—	—
Chloride of magnesium	—	—	—	—	75.171	52.6197	11.429	8.0003
Bromide of magnesium	—	—	—	—	—	—	4.376	3.0632
Iodide of magnesium	—	—	—	—	—	—	0.623	0.4361
Carbonate of magnesia	6.232	4.3624	16.271	11,3897	2.817	1.9719	9.718	6.8026
Chloride of calcium	—	—	—	—	13.225	9.2575	—	—
Bromide of calcium	—	—	—	—	2.896	2.0272	—	—
Phosphate of lime	0.797	0.5579	traces	traces	traces	traces	traces	traces
Carbonate of lime	35.887	25.1209	11.003	7.7021	31.544	22.0808	24.373	17.0611
Perphosphate of sesquioxide of iron	—	—	—	—	0.262	0.1834	—	—
Carbonate of iron	4.134	2.8938	—	—	0.857	0.5999	traces	traces
Silicic acid	0.954	0.6678	3.965	2.7755	1.447	1.0129	3.924	2.7468
Aprocrenic acid	0.210	0.1470	—	—	—	—	—	—
Crenic Acid	0.347	0.2429	0.513	0.3591	24.035	16.8245	0.476	0.3332
Organic extractive matter	0.014	0.0098	4.999	3.4993	0.033	0.0231	25.790	18.0530
	64.186	44.9302	923.111	646.1777	814.921	570.4447	1059.669	741.7683
Fixed residue found by direct experiment	64.700 cubic centime. in a liter.	45.2900 cubic inches in an imp. gallon.	922.294 cubic centime. in a liter.	645.6058 cubic inches in an imp. gallon.	817.493 cubic centime. in a liter.	572.2451 cubic inches in an imp. gallon.	1059.682 cubic centime. in a liter.	741.7774 cubic inches in an imp. gallon.
Amount of free carbonic acid at the stated temperatures	62.459	19.919	58.634	16.254	117.978	32.705	91.243	25.294
Hydrosulphuric acid	traces	traces	traces	traces	traces	traces	traces	traces

DECOCTUM CINCHONÆ.

Decoctum cinchonæ, P.L., 1824, is Decoctum cinchonæ lancifoliæ, P.L., 1836. In the "Table of Former and New Names," at the end of the authorized translation of the Pharmacopœia of 1836, we are told that Decoctum cinchonæ is the old name for Decoctum cinchonæ *cordifoliæ*, and at page 138, where the formula is given, that Decoctum cinchonæ is the old name for Decoctum cinchonæ *lancifoliæ*.

Now, as the Decoctum cinchonæ of the late Pharmacopœia was made from Cinchona *lancifolia*, it is manifestly erroneous to apply the name (*Decoctum cinchonæ*) to the decoction of Cinchona *cordifolia*, while the original preparation retains a place in the present Pharmacopœia.—D. H.

GUTTA PERCHA MEMBRANE,

For Protecting the Skin against the Contagion of Animal Poisons.

BY WILLIAM ACTON, ESQ.

The author states that he has been engaged in performing various experiments with solutions of gun cotton, gutta percha, and caoutchouc, with a view of testing their property of protecting the surface from the influence, by contact, of contagious poisons, and the following are the conclusions at which he arrived:—1. That a solution of gun cotton, when dry, corrugates the skin too much to be available for the purposes required. 2. That gutta percha alone is devoid of elasticity and sufficient adhesive quality, whilst the solution of caoutchouc wants body and is too sticky; but that, 3. The compound solution of caoutchouc and gutta percha possesses the requisite qualities to fulfil the purpose required. It is prepared by adding a drachm of gutta percha to an ounce of benzole (the volatile principle of coal naptha), and ten grains of India rubber to the same quantity of benzole, each being dissolved at a gentle heat, and then mixed in equal proportions. The author has employed this compound in painting the surface surrounding a chancre with the solution, and found that the acrid secretion had no effect upon it when dried, and warm or cold water may be applied with impunity. He considers that it may be employed advantageously in many and various ways, as in protecting the hands during *post-mortem* examinations, in preserving the cheek from excoriation in gonorrhœal ophthalmia, and in covering the parts contiguous to a sore where water-dressing is the application, &c. A letter from Mr. Quekett to the author states the results of that gentleman's examination of these several solutions under the microscope. A dried film of the compound is described by him to be perfectly elastic and free from perforations, though in many parts less than the $\frac{1}{500}$ of an inch in thickness.

POISONING BY MISTAKE.

An inquest was held on Saturday, November 11, at the Three Horse-Shoes Inn, Princethorpe, before G. C. Greenway, Esq., Coroner, on the body of Jane Matthews, aged thirty-eight years, who had accidentally poisoned herself the preceding morning.

Elizabeth Mann deposed that she was the wife of Charles Mann, of Princethorpe; she lived next door to the deceased; between eight and nine o'clock in the morning of the 10th November, Henry Matthews, husband of the deceased, fetched witness into his house; she found deceased violently sick: she had been poorly all the night; she said she had been taking magnesia and cream of tartar, and when she was having her breakfast she was taken violently sick; a medical man was sent for, but she died before he arrived; she complained of pain in the chest; she wished

her (witness) to keep at a distance when she vomited, from the thought that she had the cholera.

Henry Matthews resides at Princethorpe ; is a grocer and draper ; also sells a few drugs for the convenience of his customers ; was not aware that his wife had taken any thing except magnesia and cream of tartar ; did not give her the medicine, she reached it herself ; he thought she had the cholera ; was not aware she had been poisoned until told so by Mr. Blanshard.

Mr. J. C. Blanshard said he was a surgeon, living at Wolston ; was called in to the deceased on the morning of the 10th inst. ; she was then dead ; he had since examined the body ; the cause of her death was poisoning by arsenic ; he found in the stomach arsenic and magnesia; he had examined the place where the magnesia and the cream of tartar were kept, and on the shelf above there was a pot of arsenic exactly like the pot of cream of tartar ; the arsenic was half gone ; it had always been kept locked up until the last month ; the cream of tartar pot was quite full, and had not been touched ; the pots are similar, and in the dusk of the morning she might have mistaken the pots; if she had meant to have poisoned herself she would have taken the arsenic alone, and not have combined it with magnesia ; had she taken carbonated magnesia it would have tended strongly to counteract the effects of the poison ; and the impression upon his mind was, that she took the poison by mistake, the pots of arsenic and cream of tartar being exactly alike.

The jury returned a verdict of "Accidental death."

FATAL RESULT OF THE ACCIDENTAL ADMINISTRATION OF STRYCHNIA.

The following account of this melancholy occurrence is condensed from the report in the *Hampshire Independent.* Mrs. Smyth, wife of Captain Sergison Smyth of Romsey, had been for some time past in a delicate state of health, and had been in the habit of taking a tonic mixture containing salicine. This mixture had been prepared by several Chemists in different towns of the west of England, where the family had been residing, and since their return, by Mr. Jones, Chemist and Druggist, of Romsey. On Monday last another bottle of the tonic was procured from Mr. Jones, a part of which was taken for the first time by the lamented lady about seven o'clock on Tuesday morning. A few minutes after this she became suddenly ill, very much convulsed and cramped. Mr. Taylor, Surgeon, of Romsey, was immediately sent for, but when he arrived, Mrs. Smyth was stretched on the floor of her bed-room, cold and dead, although only about an hour and three-quarters had elapsed since she took what was supposed to be her usual tonic draught. From what has since transpired, it appears that Mr. Jones, who is almost proverbial for his correctness in attending to prescriptions, and who on this occasion furnished the mixture himself, instead of putting into the mixture *salicine*, he used the same quantity (nine grains) of *strychnine*, a poison of deadly nature and of most powerful effect. Mr. Jones, as soon as he heard of Mrs. Smyth's illness, discovered his awful mistake, and hastened to Jermyn's house, where he met with Mr. Taylor. Mr. Jones immediately told him what a frightful error he had committed in mixing up the medicine.

INQUEST ON THE BODY.

An inquest was held upon the body at Jermyn's house. The jury proceeded to view the body, which appeared from its countenance to have no indication of any other than a natural death. The first witness examined

was *Caroline Hickson*, the lady's maid and head nurse, who deposed to having procured the medicine taken by the deceased at the shop of Mr. Jones, and having given a dose of it to her.

Eliza Cooper, governess in Mr. Smyth's family, said she was called up on Tuesday morning to see Mrs. Smyth, who was very ill. She was then lying on the floor, screaming very much, and appeared in great agony. She got much worse after this, and died about ten minutes past eight o'clock.

Francis Taylor, a Surgeon, was then examined, who said he had been called in to attend Mrs. Smyth, but did not arrive until after her death. Her arms were stiff, her fingers tightly clenched, and her feet drawn very much, as if by cramp, the eyelids stuck to the eye, and the pupil was much distended. Mr. Jones the Chemist, soon afterwards came in, and said he had given the wrong medicine, and had sent strychnine instead of salicine. He had since made a *post-mortem* examination of the body, which was in perfect health, every organ was healthy. There was no obvious cause of death. It was impossible to detect poisoning by strychnine. He had analyzed the mixture of which Mrs. Smyth had taken a part, and was quite satisfied that there was a large proportion of strychnine in it. Strychnine was sometimes used as a medicine ; from a fortieth to a tenth part of a grain would be a dose. It was considered that half a grain would produce death. It was impossible to state precisely how much was taken by the deceased ; but supposing the medicine to have been of uniform strength, she must have taken between two and three grains. From the examination of the body, witness was certain the deceased must have died from the effects of strychnine. There was nothing else to account for death.

William Brodribb Randall sworn—I am a Chemist at Southampton. I assisted Mr. Taylor in analysing a bottle of mixture, said to be part of a mixture of which Mrs. Smyth had partaken. The bottle now produced is the one. It is a four-ounce bottle. It has a label on it. I cannot recollect the writing. Between a third and fourth part of the mixture was gone. I took a small portion of the powder at the bottom of the bottle, about half a grain, perhaps rather more, for the purpose of examination. I tested it several times. The result is that I have not the slightest doubt but that it was strychnine, which is a vegetable poison, of which it is said half a grain will destroy life. I did not analyse the fluid of the mixture. All the experiments I made led me to the same conclusion. I am well acquainted with strychnine. I cannot tell what else there was in the mixture. Salicine resembles strychnine in colour and weight ; so that, in haste, the one might be mistaken for the other, without chemical ignorance. We keep strychnine in a little cupboard, with other medicines, which we use very seldom. Salicine is often used a great deal. I am perfectly satisfied with the accuracy of the tests. I could recite what tests I used at any time. The tests I employed were, first, two physical tests ; first its insolubility in water. Its excessive bitter taste was evident when diluted. I dissolved a minute quantity, by means of an acid, in water. I then added a solution of potash, which caused a white crystallized precipitate, which proves that what I absorbed was a base. A small grain of the powder was heated on a piece of platinum, which, when it was charred, was dissipated, proving to be an organic substance. From these two tests I inferred it was a vegetable alkali, Another minute portion of the powder was heated with a drop of strong sulphuric acid, when it was dissolved without the production of colour, proving the absence of certain other vegetable alkalis. To a few drops of acid solution I added a small portion of bicarbonate of soda. No precipitate was produced ; but crystals soon

appeared, which proves the absence of other vegetable alkalis. I added to a few drops of the solution a solution of iodic acid. A faint violet colour was produced. This was a test that strychnine was present. I dropped a small quantity of the powder itself into strong nitric acid. This produced a distinct red colour—another proof of the presence of strychnine. I added a solution of corrosive sublimate, causing a white precipitate—another proof of strychnine. From all which tests the presence of strychnine was positively proved. There was not time to examine the contents of the stomach chemically. If it were examined, the result would be very uncertain. It is difficult to find so small a portion of strychnine in the stomach.

Mr. Jones having heard all the evidence, and having been cautioned as to what he should say, that in case of the matter going to a trial what he might say would be produced against him, and therefore advised not to say anything that might criminate him, said that he wished to make a statement. On Monday last, between four and five o'clock in the afternoon, I was called by my apprentice into the shop, where I saw Caroline Hickson, head nurse to Captain Smyth's family. I passed the compliment, and asked her how she was, and she did the same. She said she wanted some black draughts for the children—two for two young children, and one, a stronger one, for Master Knightly. I began putting up the draughts, and entered into general conversation. I asked if the children were unwell. She said no, but they wanted a little aperient medicine; that for Master Knightly must be rather strong. After I had put up the draughts and they were all wrapped up, she said, "I think Mrs. Smyth wants some of the medicine that she had last; at all events I will take one bottle." I said, "Very well, I will make it up directly." She said, "Let it be as quick as you can." I told my apprentice to get the prescription book, that I might see the prescription. I saw it contained salicine: I said to my apprentice, "You had better go to Mr. Taylor's and get me a little more, as I don't think I have sufficient." He said, "I don't think they have any more." I said, "What I have I suppose will be enough for a single quantity, perhaps you will take that, Caroline." She said, "O yes, that will do very well." I then got a four-ounce bottle from the place where they are kept, and went up some steps to get the salicine, which is kept on an upper shelf. The shelf is at one corner of the shop, where I keep things not often used. I reached down, as I thought, the salicine, and weighed out nine grains of it, and put it on some pink paper to put into the bottle. It appeared whiter on pink paper. I told my apprentice to write a label—"The mixture as before—Mrs. S. Smyth." I then put it into the bottle without putting it into a mortar, knowing that salicine is perfectly soluble without rubbing down. I then added the tincture of orange peel and water to fill the bottle. I gave it to my young man to tie up, as I was obliged to leave the shop for a particular occasion. When the mixture was nearly finished, Caroline Hickson said she would call again for it in a few minutes. It was beginning to get dusk. I had the gas lit immediately after making up the medicine. When I returned the young man had wrapped up the medicine, and I wrote the name, Mrs. S. Smyth, on the outside, Caroline Hickson soon afterwards returned, and took the medicine away with her. I was not in the shop when she came, but I was called as soon as she came. I then told my young man to remind me to write for some more salicine at night. I think then my tea was announced, and I left the shop. I was through the evening obliged to go out several times on business, which I was not aware of when I mixed the medicine. I was detained longer than I expected, and did not write for the salicine that night. The following morning, after I had breakfasted and gone up stairs to dress, I went into the shop as usual. My young man

said, "Did you see the horse gallop into town with Captain Smyth's servant this morning?" I said, "No, what was the reason, do you know?" He said "No, but I saw Mr. Taylor go off directly afterwards." I said, "I hope Mrs. Smyth is not worse," and turned round towards my desk. I then saw the bottle I had used the previous night, I took it up, and saw that it was labelled Strychnine. I said, "Oh my God! I have given this in mistake to Mrs. Smyth." I then rushed and told Mrs. Jones, but I was so agitated that she did not at first understand me. I then sent the young man to Mr. Taylor's surgery to know what was the matter with Mrs. Smyth. He returned and said he did not know what was the matter, as Mr. Taylor had not returned. I had a partial hope that she had not taken the medicine, because Caroline had said she thought there was a little left of the other. I then ordered a horse and chaise to be got ready immediately, and waited while it was getting ready. My wife, seeing me so much excited, met me at the White Horse gateway to go with me, fearing lest I should drive too rapidly and produce another accident. I soon got to Jermyn's. When on the grounds I met Mr. Taylor. I asked Mr. Taylor how Mrs. Smyth was. He said she was dead. I cannot express what were my feelings, but I think Mr. Taylor gave it in evidence the other day. That is all I have to say. As far as I can recollect, they are the principal facts. The reason I keep salicine in so small a bottle, is because I want very little, and the same with strychnine. That is my reason for keeping those articles in an upper corner of the shop, because they are seldom used. That is all I have to state.

The *Coroner* then summed up to the jury, remarking on the length of time the inquiry had occupied, and the very important nature of the subject, and explaining the state of the law with regard to homicide caused by a culpable negligence.

The Jury deliberated for nearly two hours, and then returned a verdict of Manslaughter.

The *Coroner* then informed Mr. Jones of the result, and took the opportunity of complimenting him upon his conduct since the melancholy misadventure, and the frankness and readiness with which he had disclosed all the circumstances connected with it.

REVIEWS.

A Dispensatory, or Commentary on the Pharmacopœias of Great Britain; *comprising the Natural History, Description, Chemistry, Pharmacy, Actions, Uses, and Doses of the Articles of the Materia Medica. By* Robert Christison, M. D., V. P. R. S. E., &c. Second edition, revised and improved, with a Supplement, containing the most important New Remedies. Edinburgh: Adam and Charles Black. London: Longmans. 8vo, pp. 1003.

The general character of this work is so well established, that a lengthened description of its contents, arrangement, and merits would be superfluous. It is the standard authority of the Pharmaceutical Chemist in Scotland; and as it comprises the Pharmacopœias of the three kingdoms, with ample notes and commentaries, it is equally valuable as a general book of reference in England and Ireland. The completion of the present edition has been delayed partly in anticipation of a new London Pharmacopœia, and partly from the pressure of other occupations, on account of which the author informs us, in his Preface, that he has availed himself of the assistance of Dr. Douglas

Maclagan, in adjusting his notes and supplying numerous valuable additions. In a work of this magnitude and comprising descriptions of so many substances and preparations, some of which have been subjects of controversy among the best authorities, the lapse of a few years has, as might have been expected, rendered a few corrections and alterations necessary. On this subject we quote from the Preface:—

For some of the corrections, the author is indebted to Mr. Richard Phillips, who with a pertinacity of criticism, unexampled in these days, has during several years exercised his censorship on the book from time to time in three distinct periodicals, and in an express publication. A Dispensatory being no fit field for controversy, the author has been content with silently adopting or rejecting the proposed corrections according as they were felt to be just or unjust, reserving till the present opportunity the expression, once for all, of his sense of the uncommon pains and trouble which have been taken by Mr. Phillips.

Leaving the birch in the hands of Mr. Phillips, whose reputation as a castigator is unrivalled, we turn with satisfaction to the other side of the picture. With the naked eye we perceive numerous merits which the microscope of Mr. Phillips might fail to detect—his faculty lying quite in the opposite direction; and as a specimen of the style of the work before us we quote the following article on a subject which has of late excited much interest in the profession:—

CHLOROFORMUM—CHLOROFORM—TERCHLORIDE OF FORMYL.

Chloroform was discovered in 1832 almost simultaneously by Soubeiran and by Liebig. In 1835, Dumas first successfully investigated its composition and relations to other bodies. Dr. Mortimer Glover in 1842, and Flourens in March, 1847, first ascertained its action on animals. And in November of the same year, Dr. Simpson discovered and applied its most remarkable properties as an anæsthetic agent in delivery, in surgical operations, and in various diseases.

Chemical History.—It was first obtained by the action of alkalis on chloral. But it is now prepared more cheaply and easily by the action of bleaching powder on either alcohol or pyroxylic spirit. The most fragrant chloroform is obtained with alcohol. One pound avoirdupois of bleaching powder, with three pounds of water and three ounces of rectified spirit, yields, by distillation in a roomy vessel, about nine fluidrachms of crude chloroform of the density 1.220. After this the residuum begins suddenly to froth up. The crude chloroform, which is covered in the receiver by a stratum of weak spirit, is purified by shaking with it half its volume of sulphuric acid gradually added; and water and alcohol being thus removed, the strong chloroform is freed of a little sulphuric acid by redistilling it from milk of lime or baryta. The product, which is pure chloroform, if the process be well conducted, amounts to about half a fluid ounce. I have not found the quantity to be increased, as some have represented, by increasing the alcohol.

It is a transparent, colourless, mobile, heavy fluid, of the density 1.480 at least, of a peculiar, fragrant, ethereal, apple-like odour, and of a corresponding ethereal, slightly acrid, intensely sweet taste. A globule presents singular alterations of form under the influence of diluted acids and alkalis, though no chemical change ensues (Dr. George Wilson). It quickly evaporates in the air, and it boils at 140° F. It does not burn, and it

communicates a dull, yellow, sooty flame to burning alcohol. It is readily soluble in alcohol and ether, but only in 2000 parts of water; to which, however, it imparts its strong peculiar odour. It dissolves volatile oils, camphor, caoutchouc, wax, and resins. According to Liebig, it also dissolves sulphur and phosphorus; but Mr. Alfred Taylor denies this. Strong sulphuric acid has no action on it in the cold. Alkaline solutions boiled long with it convert it into chloride of the metalloid and formiate of the alkali. It consists, according to Dumas, of three equivalents of chlorine united with two of carbon and one of hydrogen, that is, with one equivalent of formyl, the compound radicle of formic acid (C_2 H Cl_3, or Fo Cl_3). It is, therefore, the terchloride of formyl.

Adulterations.—It is often adulterated. The most frequent impurity is alcohol. This is easily detected by the density being more or less reduced, or by its drops becoming opaline when dropped into water. It may also contain, through faulty preparation, a trace of sulphuric acid; which may be discovered by litmus-paper, or the action of nitrate of baryta on distilled water agitated with it. Other compounds of hydro-carbon are probably also sometimes present; but this branch of the subject has not been studied, although it will probably explain the occasional anomalous effects observed in medical practice.

Actions and Uses.—Chloroform is in large doses a narcotic poison, and in medicinal doses a stimulant, sedative antispasmodic, anodyne, and anæsthetic. Irritant effects have also been observed; but these are inconsiderable, when it is pure.

In large doses, it occasions a state of deep coma, which may prove fatal. In such cases convulsions are not common. For the most part no marked direct influence is exerted on the heart; for in animals immediately after death the blood is found dark in its left cavities, showing that it had continued to beat after cessation of the breathing. Nevertheless, in certain unascertained constitutional circumstances, excessive depression of the heart's action is apt to be produced in man. I have not myself witnessed this. But Dr. Dewar, of Toryburn, informs me, that he once observed prolonged deliquium and an excessively feeble pulse produced by the inhalation of an ordinary dose; so that powerful stimulants were required for three-quarters of an hour, and he was for some time apprehensive of the result. Two fatal cases have occurred in the human subject, one from an ordinary dose, the other from a larger quantity. The immediate pathological cause of death in these instances is obscure; but both are very extraordinary, when it is considered that many thousand trials must now have been made on man without any serious accident or inconvenience. In both, the lungs were much congested, and in one, affected with patches of pulmonary apoplexy—appearances which have been also witnessed in animals.

When taken internally in medicinal doses, chloroform acts as a calmative and antispasmodic. So early as 1838, Dr. Formby, of Liverpool, used it on account of these properties in hysteria; and in 1844, M. Guillot, of Paris, made use of it as an antispasmodic in asthma. No great attention, however, has been since paid to its actions and uses when given in this manner, although there can be little doubt that it will prove an important remedy. It seems to be serviceable for arresting chronic vomiting from nervous causes, such as that which occurs in pregnancy.

When inhaled in the dose of twenty or thirty minims from a handkerchief, it speedily occasions whizzing and pulsation in the head, a change in the apparent colour of objects, pleasurable ideas and visions, loss of consciousness or a semi-conscious state, and either soft sleep, or tendency to laughter and jocularity, or propensity to incoherent talking, or boisterous turbulence. And when this state passes off, which happens at five or

six minutes at most, there is little or no recollection of what has passed, and no remembrance of pain, even although pain may have been expressed. These phenomena closely resemble in nature and variety the effects of the inhalation of nitrous oxide gas. The effect on the heart's action is variable. The most frequent deviation I have observed is some increase in the frequency, and diminution in the force, of the pulse; but often no distinct change takes place, and occasionally the pulse is strengthened.

When a dose of one fluid drachm, or somewhat more, is inhaled in the same way, the most frequent effect is the rapid production of coma, with complete relaxation of the muscles, slow and often stertorous breathing, upturning and fixing of the eyes, and total insensibility to agents which cause in ordinary circumstances the most acute suffering. The pupils are variously affected, but always contractile. Some frothing at the mouth is not unusual. Slight convulsive twitches of the face or limbs are more rare. The insensibility may begin in fifteen seconds—and is seldom postponed beyond two minutes, if the chloroform be skilfully applied. It continues usually between five and ten minutes, but sometimes for two hours, if the inhalation has been kept up for some time by renewing the chloroform on the handkerchief. Sometimes quiet sleep succeeds, more generally a drowsy dreamy state, but not unfrequently rapid complete consciousness and activity. In general, no recollection whatever is retained of any occurrence during the state of insensibility, but sometimes there seems a dim apprehension of what passed. For the most part, there is no remarkable subsequent effect, no lassitude, no headache, no sickness, no loss of appetite—occasionally, however, a little weariness or sickness.

Other results have also been observed, but so seldom that they must be considered anomalies, depending on constitutional peculiarities, or impurities in the chloroform. I have witnessed violent tetanic spasm twice in the healthy state and once in delirium tremens, but without any ill consequence; hysteric agitation, contortions, and screaming have also been witnessed, also without any ultimate harm; and during both of these affections there has been no recollection afterwards of any uneasiness. Sickness and vomiting have sometimes occurred, chiefly, according to my observation, when the remedy was used too continuously, so as greatly to obstruct the breathing. Relaxation of the sphincters is an untoward incident, which is not so frequent as might be expected. The only really formidable affection is sinking of the pulse, as in the case adverted to above, and this seems a rare occurrence.

The special uses of chloroform are numerous. It has been substituted for the inhalation of sulphuric ether, to induce insensibility during surgical operations. For this purpose it has the advantage over ether of being much more rapid in its action, and more certain of acting in a much less dose, of requiring no nicer apparatus than a handkerchief, and consequently of being applicable in some circumstances, such as in operations near the mouth, and in almost all operations on children, in which ether can scarcely be made available at all. Since its first recommendation by Dr. Simpson, it has been extensively used in this city in the way of inhalation to subdue the sufferings of child-bearing. Its effect is perfect, and may be maintained uninterruptedly for many hours, without influencing the frequency or force of the uterine contractions, and without any eventual harm. It is only when the deepest coma, with suffocative stertor, is brought on, that the uterine contractions are apt to be arrested for a time—a property which may be taken advantage of to facilitate the operation of turning. I have used it with great advantage in the same manner to arrest hiccup, even during fatal peritonitis, and to put an end to the paroxysm of tic douloureux. Others have found it efficacious in asthma, hysteria, chronic vomiting, and delirium tremens. It has also been found

of service occasionally as a hypnotic in the noisy forms of chronic insanity; and as a temporary measure it has proved most serviceable in the removal of obstreperous lunatics from one place to another.

It will probably be found to serve for some of these purposes equally well when taken internally.

The dose for inhalation is a fluid drachm at a time, which must be renewed in two minutes if the desired effect be not induced. There seems no limit to the safe repetition of it. Dr. Simpson has used eight fluid ounces in thirteen hours in a case of labour. The patient experiences least annoyance, and is least apt to show a precursory stage of excitement, when a full dose is used at once. Innumerable chloroform inhalers have been contrived in London and Paris; but nothing is so convenient as a small muslin or silk handkerchief loosely twisted into the form of a bird's nest; no other apparatus is used in Edinburgh, and no inhaler can be more efficacious. When the effect produced is too intense, the best remedies are the horizontal posture, cold air fanned across the face, and a stream of cold water poured on the brow and head only. Ammonia may be inhaled also; but internal stimulants should not be given till the patient revives in some measure, otherwise the respiration may be further embarrassed. In urgent circumstances, artificial respiration must be promptly added to these means.——The dose internally is probably from five to twenty minims. It may be given dissolved in water with the aid of a little spirit.

Our readers will perceive that Dr. Christison has Latinized the word chloroform as *chloroformum*, placing it in the second declension, neuter gender, to which there can be no objection.

Our space does not admit of other quotations, but the above is a fair specimen, and we recommend the work as a valuable text-book and work of reference to the Pharmaceutical Chemist.

An Introduction to Botany. By John Lindley, Ph. D., F.R.S., Professor of Botany in University College, London, &c. Fourth Edition, 2 vols., 8vo. Longman and Co., 1848.

It is with great pleasure we announce to our botanical readers the appearance of a new edition of Dr. Lindley's valuable *Introduction to Botany*. A period of nine years having elapsed since the publication of the last edition, so considerable a change has taken place in the science of Botany, as to render numerous additions and modifications necessary in this. The author says,

"It has been my wish to bring every subject that I have introduced down, as nearly as possible, to the state in which it is found at the present day. In doing so, I have added so very considerable a quantity of additional matter, especially in what relates to Vegetable Anatomy and Physiology, that the present edition may be considered in those respects, a new work."

The author in his preliminary remarks defines a plant as "a cellular body possessing vitality, living by absorption through its outer surface, and secreting starch." This definition, in the present state of our knowledge, is, perhaps, the least objectionable one which could have been given. For it appears now well ascertained, that the only valid distinction between the lower tribes of the vegetable and animal kingdoms, is the presence of starch in plants, whereas this organic compound has never been found in the animal kingdom. By this test, the

nature of the true corallines, as well as many tribes described as animalcules by Ehrenberg, and other naturalists, have been ascertained, and found to belong to the vegetable kingdom.

The theory of cell-formation, which was in its infancy at the date of the last edition, is well treated of in this. The author gives an abstract of all the chief theories which have been brought forward to explain this process. Without expressing any decided opinion as to the merits of either, the author appears to think very highly of Mr. Thwaites's theory, of which he gives the following abstract:—

"Cells are formed by Cytoblasts generated amidst mucus or protoplasm, by the action of the Cytoblast and certain electrical currents connected with it, of which forces the Cytoblast is the centre. The electrical currents are caused by chemical changes, arising from the vital processes which go on amidst the endochrome or contents of the cell."

We think that no one theory will satisfactorily account for the process as it occurs in all parts of the vegetable, and the opinion of most observers is, that in vegetating or growing parts, multiplication by cell division is the regular mode of increase, whereas, spores, pollen, and embryos, are produced by free cell formation from nuclei. For an account of these two theories, we must refer the reader to the author, as our space will not allow us to proceed further with this subject.

We find in this edition a full account of the recent investigations of M. Planchon, upon the arillus of plants. Planchon defines a true aril thus: "It is formed after fecundation—it is an expansion of the umbilical cord over the seed, and leaving an orifice only opposite the micropyle." We have a good example of the true arillus in the passion-flower. From this, the true arillus, Planchon distinguishes what he has called an arillode, or false arillus, and from his investigations it appears that the envelope of the nutmeg, cited as an example of an arillus in our Pharmacopœias, and known officinally under the name of *mace*, is nothing but an expansion of the exostome of the seed, and is therefore not a true arillus, but an arillode or false arillus.

In the present edition we find no mention of the class of Dictyogens of Lindley, which was founded chiefly upon peculiarities in the structure of the stems of certain plants, and of which class we have a good example in the sarsaparilla of the shops. We presume as the name of Dictyogens does not occur in this edition, that the author has modified his views with regard to the necessity of this class in the vegetable kingdom.

We had intended to have given a list of the more important additions in the present volume, but find that our space will not allow us to do so, as almost every chapter has undergone considerable modification. For much of the subject matter contained in these alterations, the author states that he is indebted to the valuable translations which have appeared in the *Annals of Natural History*, to which periodical he does full justice, and we also take this occasion of expressing our sense of the very great merit of this periodical.

In conclusion, we would recommend those of our readers who are desirous of attaining a complete knowledge of the present state of Anatomical and Physiological Botany, to procure this work, believing it to be equal, if not superior, to any Introduction to Botany in this or any other country.

Elements of Chemistry. By Thomas Graham, F.R.S. Part 3. 2nd Edition.

An Introduction to Practical Chemistry. By J. E. Bowman.

L'Officine ou Repertoire Générale de Pharmacie Pratique. Dorvault. 2nd Edit. Paris. 8vo, pp. 892.

Anæsthetic Midwifery; *Report on its early History and Progress.* By J. G. Simpson, M.D., &c. 8vo, pp. 52. Edinburgh: Sutherland and Knox, George Street.

A very interesting pamphlet.

Remarks on Chloroform in alleviating Human Suffering, *addressed particularly to the Female Sex.* By W. H. Bainbridge, Esq., F.R.C.S., &c. 8vo, pp. 43. London: S. Highley, Fleet Street.

The Treatment of Asiatic Cholera. By Archibald Billing, M.D., A.M., F.R.S. 8vo, pp. 15. S. Highley.

Cholera; *Practical Observations.* C. Patterson, M.D. Pp. 8. Dublin: Hodges and Smith.

The Antidotal Treatment of Epidemic Cholera. By John Parkin, M.D. Pp. 58. London: W. H. Allen, Leadenhall Street; S. Highley

Practical Observations on Galvanism, Electricity, and Electro-Magnetism, *applied by means of Baths.* J. P. Tylee. pp. 47. Bath: C. Clark, Bridge Street.

Observations on the Pathology of the Croup, with Remarks on the Treatment by Topical Medications. By Horace Green, A.M., M.D., &c. 8vo, pp. 115. New York: John Wiley; London: 13, Paternoster Row.

An Essay on the Teeth. By Augustus Cook. Small 8vo, pp. 75. London: John Churchill.

TO CORRESPONDENTS.

P. B. E. (*Bath*).—There is no standard strength for veratria ointment. Ten grains to the ounce is a common proportion; but we have seen as much as thirty grains ordered.

A Member (*Plymouth*) inquires whether *caoutchouc* should not be pronounced *cahuchu?* Some persons pronounce it in that way; but we think the correct pronunciation is as it is spelt.

A Member (*Salford*).—The colour of cod-liver oil varies according to the condition of the livers and the method adopted for extracting it. When the livers are fresh, and the oil is carefully obtained with a moderate heat, the colour is pale, but the partial decomposition of the livers by putrefaction or heat alters the character of the oil, and generally gives it a darker colour. We are not aware of any process by which bad or dark cod-liver oil can be deprived of its colour without changing its properties.

Alpha and *R. J.*—*Noad's Lectures on Electricity and Galvanism.*

T. G. E. (*Torquay*) recommends the trituration of chloroform with a few grains of spermaceti and a little water and straining through fine muslin, as a means of suspending it. [We think yolk of egg a better vehicle, as recommended by Mr. Morson, vol. vii., page 348.]

An Ex-Associate (*Oakingham*).—Commercial muriatic acid should not be used for medicinal purposes, or for making unfermented bread, but the pure acid. See vol. vii., page 127.

P. G., M. P. S.—Citrate of potash is, as its name implies, a salt composed of citric acid and potash. In the prescription alluded to, the solution is most likely intended, consisting of lemon-juice saturated with carbonate of potash.

W. E., A. P. S.—We are unable to give the information required respecting Dutch drops. It is probable that this, like other patent medicines, is often imitated. It should never be sold without a stamp.

G. P.—The fullest information respecting the origin and properties of gutta percha is given in vol. vi., pages 377, 379, and 382, and vol. vii., page 179 of this Journal.

A Member (*Sunderland*) will find some good formulæ for *Hair Dyes* in the last edition of *Gray's Supplement.*

C., A. P. S.—The powder sent appears to be the mixture of lime and oxide of lead, which is frequently used for dyeing the hair.

E. H. (*Clifton*) states, in reference to a question in a recent number of this Journal, that the detonating balls sold at the toy-shops consist of fulminating silver enclosed in tissue-paper, with a few pieces of broken china.

Stramonium—De Candolle's arrangement of plants is principally followed by Dr. Pereira and also by Dr. Royle, and would be considered satisfactory by the Board of Examiners.

M. P. S. (*Bristol*) wishes for a formula for making incense such as is used by the Roman Catholics.—(2.) *Pot Pourri.* See vol. iv., page 339.

Fraternity.—The change of colour must be due to the presence of some impurity.

Q., M.P.S.—For the means of preserving the sweets in cyder, see vol. ii., page 289.

D. W. D.—The Tyrian purple dye was obtained from a fish, or rather fishes, for several species of *Purpura* and *Murex* yielded it. These fishes are found in the Mediterranean and the seas of the Spanish West Indies. The purple dye is said to be in the throat of the fish. It can only be used at the moment of its being extracted.

G. P. may obtain the numbers mentioned from the Publisher through any bookseller.

T. M. O., A. P. S.—It is illegal for a person to sell grains of Paradise or alum, knowing or *suspecting* them to be required for an illegal purpose.

M.P.S. (*Birmingham*).—The sample is not a good one.

S. (*London*), and *T. S. C.* (*London*)—We disposed of the subject last month.

A.P.S. (*London*) informs us that the closing of shops on Sunday has been generally adopted in his neighbourhood, with two or three exceptions. The letter being anonymous, would answer no purpose if published.

Juvenis.—Robinson on the Teeth.—Vol. vi., page 92.

A Member (*Cheltenham*) wants a formula for harness polish.

A. P. S. (*Montague Street*) should write to the Secretary with his name.

Amicus.—The suggestion is not a new one. It has frequently been considered. See vol. vi., pp. 99—115.

An Associate (*Worcester*).—During the current year, from Jan. 1 to Dec. 31.

W. S. (*Hereford*).—There are no Examiners connected with the Pharmaceutical Society except the Board in London.

Spongio piline is sold by most Chemists. The patentee is Mr. Markwick.

W. H. (*Woolwich*).—Spirit may be separated from vinegar by neutralizing the latter with an alkali, and then distilling off the spirit.

We have received the "American *Curiosity*," It is a remarkable specimen.

Advertisements to Mr. CHURCHILL, Princes Street, Soho.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. SMITH, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the EDITOR, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. VII.—JANUARY 1st, 1849.

PHARMACEUTICAL EDUCATION.

"Though individuals may elevate themselves, by force of unusual attainments or special endowments, above the rank usually accorded to their calling in life, yet we all know that every profession and business has a certain status attaching to it, and that this status is considered to belong to the majority of persons following any given calling. Hence the desire of all men of right feeling to maintain, and if possible to elevate, the rank of his own profession;—though it is sometimes forgotten, in the busy endeavours after extrinsic regulations and legislative protection, that the true way of attaining this end, is, for each individual member of a profession to adopt a higher standard for himself, and so to bring about that real internal elevation and improvement of the body, which will force from society at large the acknowledgment of a higher position."

The above is quoted from the excellent lecture of Dr. Fripp, of Clifton,* and we repeat the passage because it conveys in a few lines a sentiment which, during the last seven years, we have been endeavouring to impress upon the minds of our readers. The most stimulating, and at the same time the most praiseworthy, inducement which can influence any class of the community in the promotion of education and reform, is the desire to raise their social position, to extend their influence, and increase their moral power. In the year 1841, when the Pharmaceutical Society was founded, an immediate application to Parliament for an act or charter was proposed by many of our Members, under the idea that this was the only means by which our rights and privileges could be secured. The restriction of unqualified hucksters, and the protection of unqualified Chemists, were alike to be effected by Act of Parliament. We say *unqualified Chemists*, because the plan at that time proposed had no reference to qualification, it was based on commercial principles—a trial of strength between one class of tradesmen and another. Further reflection and inquiry into the facts of the case led to the conclusion that the wedge by means of which our standing could be raised, and our rights secured, was education; and a scientific society was the result.

The only true source of greatness is mental cultivation. Riches may dazzle, rank may excite envy, but the man who commands respect and esteem is he who, however humble may be his avocation, fulfils the duties belonging to it with integrity, intelligence, and skill. We are told that a rich man inquired of Socrates for how much he would educate his son. On hearing the terms, he

* See the last number, page 281, and the present number, page 325.

observed that he could buy a slave for the money, to which Socrates replied, " Buy him and you will have two."

Considering the advantages which are now offered to the young men in our profession, and the general impulse which by common consent is given to the spread of knowledge, it would be an insult to the good sense of the rising generation to doubt their zeal and sincerity in availing themselves of that improvement on which their future success in life must depend. Although the School of Pharmacy in London can accommodate only a limited number of pupils, its influence will extend far and wide. The demand for Pharmaceutical education gives rise to the publication of text-books, lectures, and numerous elementary works adapted expressly for the student. Let it be known that a demand for practical instruction exists in provincial towns, and the London school will no longer stand alone; it will become the centre of a large circle. It would, however, be vain and imprudent to contemplate the establishment of a practical school in any district unless satisfactory evidence were afforded of the probability of assiduity on the part of the students. Without this, no school can flourish; for however perfect may be the arrangements, and however eminent the teachers, no lecturer can impart knowledge to empty benches or idle students.

Even in Bloomsbury Square, although the lecture-room is attended by some students whose example is worthy of commendation, there are others within a moderate distance, who neglect the advantage thus offered, and who will probably have reason to regret this indifference. We make every allowance for those whose business duties do not admit of their absence even for an hour, twice a week, and it is much to be regretted that any such obstacle should stand in the way of this opportunity of improvement, alike important to the student and his employer. But what would be said of a young man residing within a mile of the lecture-room, who is not only permitted, but strongly urged, to attend the lectures, and who declines to do so, preferring to retain his two guineas in his pocket and his vacuum in his head, and when he comes up for his examination is found wanting? Let us hope that this is an imaginary case.

The suggestion of Dr. Fripp to establish a Pharmaceutical Class in the Provincial Medical Schools is worthy of consideration. The only objection which occurs to us is the communication which would thus be established between Medical and Pharmaceutical Students. It is impossible to put old heads on young shoulders, and wherever a large number of young men are congregated together, many of them residing in lodgings, without any controul or supervision, it will always be the case that idleness and dissipation will prevail to a certain extent, and this is a disease which,

like fermentation, spreads by contact. The most effectual remedy or preventive is a strict oversight on the part of those under whose care the students reside.

It is also important to use every practicable means to inspire the minds of young men with a laudable ambition and desire for distinction. Much has been said against the practice of offering prizes as an inducement to industry, and a few isolated cases are brought forward in which young men have overtaxed their strength and fallen victims to intemperate study. The loss of young men of this class is deeply to be regretted, and such a loss creates a sensation, because such men are rare. But how many hundreds fall victims to the opposite extreme, launch out into dissipation and riotous living, ruin their constitutions, become involved in debt, wear out their friends, and die unheeded, we might almost say unregretted. Their names are not mentioned, their misery excites no compassion, for it is known only to themselves, and in delicacy to their relations the veil of oblivion is spread over them. But when a young man happens to die honourably of overwork, his anxious parents, instead of congratulating themselves on his escape from the vortex in which hundreds are engulphed, condemn the system of mental competition, because their son has shed honour on his family by shortening his life in the pursuit of knowledge.

How different are the feelings of parents whose sons have died "honourably" in battle, while in the act of butchering their fellow-creatures! Do they condemn the system of war? By no means —they hasten to equip another candidate for the same distinction!

The only real objection to the prize system is the limited extent to which it operates, the competition being too often confined to a small number of "prize-fighters," as they are termed, with whom the majority of the class are afraid to compete. This abuse might be removed by increasing the number of prizes, and instituting several degrees of qualification, a plan which has been adopted in the School of the Pharmaceutical Society, with a satisfactory result.

Admitting that the prize system, like every other system in this world, is liable to abuse, we advocate most unequivocally the promotion of emulation and ambition among young men. Without this stimulus no great or good action was ever achieved, and although the desire to gain a prize is not a high order of ambition, it may act as a stimulus where more exalted motives are absent, and by diverting the energies into the right direction, it may, under proper advice, lead the aspirant from one step to another, until he at last loses sight of the shadow and pursues the substance.

The human mind, especially in the time of youth, can never be positively inactive. Even idleness becomes a pursuit, and taxes

industry for its gratification. The thoughts, the sympathies, and the talents must have an object on which to settle, an aim towards which to direct their course. The "fast man" may work as hard as the student—he may wear himself out as soon; the first has wasted his labour altogether, the second has directed his labour wisely, but miscalculated the strength of his constitution. The happy medium is the most difficult point to attain; but on comparing the two extremes, we cannot doubt the propriety of adopting every practicable means of diverting the industry of young men into a useful channel, believing as we do that even in the extreme case, which is a rare exception to the general rule, the victim of intemperate study reflects more honour on himself and his family than the soldier killed in battle, and his fate is to be envied when compared to that of the emaciated rake.

THE DIPLOMA OR CERTIFICATE OF MEMBERSHIP OF THE PHARMACEUTICAL SOCIETY.

The proper signification of the term Diploma, is "a letter or instrument conferring some power, authority, privilege, or honour." It is usually given by some learned body, or official authority, to persons possessing certain qualifications described or implied in the instrument in question.

It was a fundamental principle recognized in the establishment of the Pharmaceutical Society, that the passing of an examination should be a necessary condition of admission to the privilege of membership, and that a certificate or diploma should be given to the Members. It was also designed that the body granting this certificate should be a learned body in the department of the profession comprised within its province—the advancement of Chemistry and Pharmacy, and the promotion of an uniform system of education in those who should practise the same, being mentioned in the Charter as the leading objects of the Society.

If it had been possible at once to bring into existence, in a state of maturity, this institution, and to carry out from the commencement the principle on which its future character was destined to depend, the certificate of Membership would have been to all intents and purposes, a Diploma in the ordinary acceptation of the term. Although the sudden realisation of this undertaking would have been too chimerical a project to be entertained for a moment, the constitution and regulations of the Society were framed in accordance with its ultimate object and intention, such temporary modifications being made as the circumstances of the case imperatively demanded, and the Charter sanctioned.

It would have been impossible to institute a system of examination, without previously establishing the institution from which

such a system was to emanate, and as a necessary consequence the regulation respecting examination could not be enforced in reference to the original Members. If all the Members of the trade had been men of high attainments, to whom the passing of the examination would have been an easy matter, the object in view would have been already attained—in other words, the society would have been unnecessary.

But the preamble of our Charter of Incorporation contradicts this supposition, by providing for the introduction of an uniform system of education; and the Charter declares that the Society shall consist of Chemists and Druggists, who, according to the preamble, were in need of this improvement.

All the objects contemplated in the formation of the Society have been carried out to as great an extent as its most sanguine supporters could have anticipated on the voluntary system. The School of Pharmacy is complete in all its arrangements, and has given ample proof of its efficiency. The number of candidates for examination is increasing, and the uniform system of education contemplated in the Charter is established.

The diploma of the year 1849 is no longer the certificate of membership of 1842. It has assumed a new character: it implies a mental instead of a pecuniary qualification. Every person who now possesses a diploma of the Society has either passed an examination, or he has been in the business a sufficient number of years to give him a claim to the standing which he enjoys.

The certificate of membership has therefore become an important honorary distinction, and the Council have found it requisite to protect the Members of the Society in the exclusive enjoyment of a privilege which (with a limited exception) can now only be obtained by those who have complied with the spirit and letter of the Charter by passing the examination.

In another part of this number (page 325) is contained a report of the Council in reference to those who have seceded from the Society, and who are called upon according to the bye-laws to return their certificates of membership.

In order to prevent any misunderstanding as to the real condition of the Society, we subjoin a statement of the number of Members at the several periods named:

Founders	1842	603
Admitted	1843	1024
Admitted during the years 1844, 5, 6, 7, and 8		720
		2347

From this it appears that the number of Members admitted during the last five years is 720, while the number of defaulters

during the same period (deducting those who have responded to the late circular) is only 670, and of these 234 may be accounted for by death and other casualties. The balance, therefore, shows an increase in the number of Members, notwithstanding the difficulty of admission which the examination now imposes, and the numerous casualties which might be expected to affect a voluntary Society of this description, whose Members are spread far and wide throughout the country.

As the bye-laws empower the Council to re-admit those who have seceded from the Society, it is not improbable that the number of defaulters will be considerably reduced.

THE CHOLERA.

We have on several occasions expressed astonishment at the apparent apathy of the College of Physicians, in regard to the anticipated approach of the cholera. While the lawyers were arguing, the deodorizers scheming, the Commissioners of Sewers dictating, and the Board of Health (*alias* Works) floundering, the College of Physicians maintained a dignified neutrality, as if resolved to give the other parties plenty of *rope* in order that they might do the business for themselves. It might have been supposed that the cholera was to be "put down," by Act of Parliament, like a common nuisance, that the College of Physicians was defunct, its occupation being gone, and that Pandora's box had been handed over to the guardianship of Cloacina.

Until the circumstances of the case were explained, the serene composure which reigned in the great medical institution during the usurpation of its functions by "unlicensed practitioners," was a mystery.

The mystery is cleared up, and the conduct of the College is placed in its proper light by the following correspondence. If the history of the case were published in detail, with the dates, it would be seen that the College has not only acted with propriety during the whole transaction, but that much credit is due to that body for its forbearance and courtesy under circumstances of a very peculiar nature.

CORRESPONDENCE BETWEEN THE PRESIDENT OF THE COLLEGE OF PHYSICIANS, THE HOME OFFICE, AND THE PRESIDENT OF THE GENERAL BOARD OF HEALTH.

The Cholera Committee was appointed October 3d, 1848, and consisted of The President. Dr. Alderson, Dr. Todd, Dr. Nairne, Dr. Alexander J. Sutherland, *Censors*. Dr. Francis Hawkins, *Registrar*.

Dr. Latham, Dr. Mayo, Dr. J. A. Wilson, Sir James M'Grigor, Bart. Dr. Watson, Dr. Roupell, Dr. Roots, Dr. Babington, Dr. Richard Bright, Dr. Burton, Dr. Burrows, Dr. Frampton, Sir William Burnett, Dr. Page, Dr. C. J. B. Williams, Sir Charles F. Forbes, Dr. Budd, Dr. Guy, Dr. Kingston, Dr. Baly, Dr. Southwood Smith.

A Report having been prepared by a Sub-committee, consisting of Dr.

Babington, Dr. Burrows, Dr. Budd, and Dr. Baly, was transmitted to the Right Honourable Sir George Grey, Bart., together with the following letter from the President, dated October 12, 1848 :—

"*Dover Street, October 12th,* 1848.

"Sir,—Having learned at the Home Office that your return to town is uncertain, I forward to you, without delay, the enclosed Resolutions, and, as I have not the advantage of a personal communication, I must be allowed to avail myself of the present opportunity to offer a few remarks.

"As soon as the alarm of impending cholera had spread through the town, it was felt necessary by myself and the Censors, to constitute a Committee of the Physicians of our great metropolitan hospitals, together with certain other eminent persons ; and I trust you will regard the enclosed list as embodying the medical skill and experience of the country. This Committee will meet three times during the week, in order to collect information, and, if necessary, to suggest measures for protecting, guiding, and sustaining the public under such heavy infliction.

"It is, Sir, most unfortunate that the public mind should have been distracted, and general confidence shaken, by the dissemination of adverse and conflicting opinions, and diametrically opposed recommendations and directions, by the several authorities to which the public were bound to look for advice ; that while the Board of Health repudiates the idea of contagion as a mischievous fallacy, the Privy Council issue orders for the institution of quarantine ; that, while the former again, forbid, as dangerous, vegetable food, the College of Physicians consider such a change of diet as the adoption of that advice would involve, as calculated to deteriorate, rather than to improve the health, and consequently to increase the liability it was intended to avert.

I trust, Sir, you will receive these observations in no other light than that of a desire to call your attention to a subject of the highest importance ; amidst your numerous and anxious duties, it is not to be supposed, nor indeed expected, since a Board of Health has been appointed, that you should have deemed it necessary to enter into all the details of so difficult a subject. I have the honour to be, &c., &c.,

"John Ayrton Paris."

The foregoing communication was acknowledged by the Under-Secretary of State, on the 18th October, 1848 :

"*Whitehall, 18th October,* 1848.

"Sir,—I am directed by Secretary Sir George Grey to acknowledge the receipt of your letter of the 12th instant, transmitting a copy of resolutions agreed to by a Committee of the Royal College of Physicians respecting the nature and treatment of cholera, and I am to express to you Sir George Grey's thanks for this communication.

"I have the honour to be, Sir, your obedient servant,

"J. A. Paris, Esq., M.D., "G. Cornewall Lewis.

"*President of the Royal College of Physicians,*

"*Dover Street.*"

The President of the College of Physicians received also the following letter from the President of the General Board of Health, dated,

"*Castle Howard, October* 17, 1848.

"Sir,—As Chairman of the General Board of Health, I hope to be excused for the liberty I take in addressing myself to you ; but I have learned with concern that some suggestions contained in a recent notification issued by the Board on the subject of Asiatic cholera have met with the disapproval of the College of Physicians.

"I would observe, in the first place, that the General Board of Health, in its ordinary operation, and with the exception to which I will presently refer, is mainly a Board of Works for sanitary purposes, for the pre-

vention of disease, as far as it may be effected by such works, and its members do not propose, as far as they can avoid it, to enter into any questions of the treatment of disease. These they would gladly leave to the representatives and ornaments of the medical profession, But, in the second place, I have to advert to the exception I have named, and to the apparent deviation on the part of the Board from the course I have described. Under the Act of last Session, for the prevention of contagious and epidemic diseases, the General Board of Health are, upon the arrival or approach of such a disease as the Asiatic cholera, entrusted with functions which, under the previous Act, were exercised by the Privy Council. Even under these circumstances the Board would be extremely reluctant to trench upon any department in the more legitimate possession of others; but they were daily assailed by representations that people were waiting to hear from them what, upon the arrival of the cholera, they ought to do.

"The notification in question was drawn up by the medical member of the Board, who has given years of unremitting inquiry to this special class of subjects; in so far as it received any modification, it was upon consultation with other gentlemen of the medical profession, who gave the kindest and most disinterested attention to the matter, and whose names would be a guarantee for the value of their opinions. The Board of Health were not, at that time, informed that any other public body were moving in the business; no time could be spared; and they conceived themselves to be, even at the risk of some mistakes and deficiencies, under a moral obligation to impart to the public what appeared to them to be the preponderant evidence with respect to the means of prevention. They hoped, too, they had guarded against misconception, by occasioning it to be inferred that they addressed themselves mainly to those who were removed from the opportunities of special advice, and by distinctly abstaining from prescribing for the advanced stages of the disease, on the ground of their hope that, in every such case, recourse would be had to regular professional advice.

"With these feelings, and with respect to the future, I have only to add, that the General Board of Health will receive with respect and deference any observations, suggestions, corrections, respecting their own views, with which the College of Physicians may be pleased to favour them; they will gladly use any means at their disposal for conveying to the public any information and advice which may be obtained from so high a source; and even, if at any time the same should not be in accordance with the opinions they have been led to adopt, they will still feel themselves bound to insert all such communications in their official circular, and let them have the weight which must attach to the views of such an eminent body.

"I must further request allowance for the hurry and imperfection of the present communication, which is written upon a day when my attention is otherwise painfully occupied: but I was anxious that no time should elapse without an attempt to remove any misapprehension which may have unfortunately arisen, and to tender an explanation which may be justly due. I have the honour to be, Sir, your very obedient Servant,

"Morpeth."

To the foregoing letter the President of the College of Physicians returned an answer as follows:—

"*Dover Street, October* 23*rd*, 1848.

"My Lord,—I have to acknowledge with many thanks your Lordship's communication of the 17th instant, and to express, on the part of the College of Physicians, a gracious acknowledgment of the courtesy and consideration with which you have been pleased to recognize and appreciate the just authority and influence of that body in all matters relating to medical polity and legislation.

"On public grounds I most sincerely join in the concern expressed by

your Lordship, that the suggestions contained in a recent notification issued by the Board of Health on the subject of Asiatic cholera, should have been in direct opposition to opinions unanimously entertained by the College of Physicians.

"Your Lordship observes that the General Board of Health, in its ordinary operation, is mainly a board of works for sanitary purposes. To question the wisdom with which the Board continues to discharge such functions, would very properly expose the College to the charge of an officious and unjustifiable interference in matters alien to their studies and duties; but the objections of the College, as your Lordship will perceive, rest exclusively upon the *medical* directions published by the Board over which your Lordship presides, and when I state that any professional advice would have issued with far greater propriety and effect, under the advice and sanction of the chief medical institution of the kingdom, your Lordship will admit that I do but adopt your own opinion, for you would gladly leave such advice to the representatives of the medical profession, unwilling to trench upon any department in the more legitimate possession of others.

"Your Lordship states that the Board of Health, in drawing up the directions, or advice, contained in the notification in question, was assisted by gentlemen of the medical profession, whose names would be a guarantee for the value of their opinions; upon which I have only to observe, that, persons who consent to give opinions upon so momentous a subject, ought, at least, to be prepared to incur the responsibility attached to them.

"There is one passage in your Lordship's letter which I feel bound to notice, as it may be supposed, indirectly, to inculpate the College of Physicians, and to raise a suspicion that it had not come forward with the energy and promptness commensurate with the importance of the occasion; your Lordship observes that the Board of Health were not informed that 'any other public body were moving in the business.' Allow me to observe my Lord, that until the present instance, I believe without any exception, the Government, in all great medical questions, has uniformly called upon the College of Physicians for its opinion and co-operation, and I feel satisfied, that, had the Board of Health so acted upon the present occasion, the College would cheerfully have responded to the call.

"I have the honour to enclose a copy of resolutions passed by a Committee of the College, and transmitted to Secretary Sir George Grey, and I would observe that these resolutions are still under consideration, with a view, should it so appear expedient, to amplify, or otherwise to modify them, and that I shall have the honour of forwarding to the Board of Health a copy of the same at the earliest opportunity.

"I have the honour to be, My Lord, your Lordship's obedient servant,

"John Ayrton Paris,

"*President of the Royal College of Physicians.*"

The President of the College of Physicians redeemed the promise given at the conclusion of the last letter, by sending to the Board of Health, on the 31st of October, 1848, the resolutions of the College, as they were subsequently prepared and circulated. On the 6th of November, a second notification was issued by the General Board of Health, differing in some important points from the notification which had been previously published by that Board, and according in those respects with the resolutions of the College of Physicians.

In accordance with the assurance given by Lord Morpeth in the foregoing letter, the Resolutions of the College of Physicians were published in the Official Notification (No. 3.) of the General Board of Health. To these resolutions are appended "Observations of the General Board of Health," in which some of the opinions of the

College are discussed, and contrasted with data upon which were founded the general instructions in the Official Notification, No. 1.

The chief question at issue appears to be, whether an ordinary diet, with a proportion of fruit and vegetables, should be recommended. The Board of Health contends that during the prevalence of cholera, there is a peculiar condition of the atmosphere which affects the constitution, and occasions general uneasiness, with a tendency to disorder of the bowels, and that consequently a diet which might be found to agree very well under ordinary circumstances, would be inadmissible. Some quotations are introduced, describing the nature of the sensations, the want of sleep, or excessive drowsiness, the uneasiness of the crows, who left their usual roosting place; in fact, the general derangement of the functions of life, demanding a corresponding change in diet. The article is enlivened with a few pleasing anecdotes; for instance, the following:—"M——, a licensed hawker, twenty-three years of age, was intoxicated on the Saturday night, and locked up until Monday, when he was discharged, and took a hearty supper of pork, greens, and potatoes, at night. He was seized with cholera at two a.m. on Tuesday, and died on the same day." Now, whether the attack of cholera was occasioned by the intoxication, the locking up, or the pork, the greens, or the potatoes, is a question on which five barristers might argue for a long time. The College of Physicians would not hazard an opinion without further evidence, but the Board of Health adduces the fact in support of the instructions contained in Official Notification, No. 1, adding a few other instances in which *post hoc* is considered to imply *propter hoc*, and quoting some general remarks on vegetable diet from popular works by medical authors.

Fortunately for the public, the cholera is not making advances in this country at present, and we may hope that before its arrival, the conflicting opinions now prevailing on the important subject of diet, may be set at rest.

It is satisfactory to find from the correspondence published above, that the responsibility of the existing collision between these two authorities does not rest with the College of Physicians, as the President distinctly states in his second letter, that if the Government had acted in accordance with the usual custom in such cases, by applying to the College for its opinion and co-operation, the College would cheerfully have responded to the call.

Although the Government did not think proper in the first instance to consult the College of Physicians, the Board of Health (*alias* Works) has not been acting altogether without medical advice; but the medical adviser, being one of the "cuckoo"* genus in search of a nest, it might have been inconvenient at an early stage of the proceedings to call into requisition the services of so important and experienced a body as the College of Physicians. Indeed, we are informed on good authority, that the interference of the College even at the eleventh hour, occasioned certain palpitations and misgivings, such as might be supposed to agitate the breast of a cuckoo on the approach of a troop of schoolboys. In the present case the cuckoo was safe, his nest being protected by thorns, which grow luxuriantly in the woods and forests.

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* See p. 202 of this volume.

TRANSACTIONS

OF

THE PHARMACEUTICAL SOCIETY.

PHARMACEUTICAL MEETING,

WEDNESDAY, DECEMBER 13th, 1848.

MR. MORSON, PRESIDENT, IN THE CHAIR.

A Paper was read,

ON THE PREPARATION OF OXIDE OF ZINC BY COMBUSTION.

BY MR. G. D. MIDGLEY.

The author calls the attention of Pharmaceutical Chemists to what he conceives to be the advantages resulting from the preparation of oxide of zinc by combustion. Having directed his attention to this subject for many years, and constructed an apparatus for the purpose of effecting the combustion of the zinc, he has been enabled to overcome the difficulties which had been previously experienced in the process. The apparatus employed by Mr. Midgley is a large muffle, which is heated to redness in a furnace of suitable construction. The draught of air necessary for supporting the combustion is conveyed from the muffle by a tube passing through the top of the furnace and terminating in a vessel containing water, in which the portion of oxide which is carried off in the current of hot air is retained. With an apparatus of this kind he makes a hundred weight or two of the oxide at a time, by a continuous process, the zinc being introduced into the muffle from time to time as the combustion proceeds. Any particles of metallic zinc that may remain mixed with the oxide are subsequently separated by a sieve. The author states that the zinc or spelter of commerce is now made extremely pure, and yields by combustion a white oxide, which is free from cadmium or other metals. He expresses an opinion that the oxide obtained by the process here described, is more efficacious when used in the form of ointment, than that made by any of the processes which have been published in the modern Pharmacopœias. In confirmation of this, he alludes to a statement published some years ago by Mr. Redwood, from which it appeared that the so-called oxide of zinc of commerce, contained large quantities of water, and of carbonic or sulphuric acid. He also recommends the use of oxide of zinc made by combustion, as a substitute for white lead in the preparation of paint. Among the advantages which he conceives

would result from this substitution, are, the superior preservative effect of oxide of zinc when applied to iron, dependent upon the electro-positive character of zinc, the fact of its not being altered in colour by sulphuretted hydrogen or other gases, and the avoidance of those injurious effects upon the health which are experienced by the workmen employed in the manufacture of white lead.

Mr. Squire inquired if Mr. Midgley had practically tried the use of oxide of zinc as a substitute for white lead in paint. He (Mr. S.) had tried it some years ago in his laboratory, and found that it was very deficient in the power of *covering*, which is dependent upon the opacity of the paint.

Mr. Midgley said he had seen it used, and thought that although it did not cover so well as white lead, yet, taking this deficiency into account, the price at which it could be made would compensate for the defect. He had calculated that three coats of zinc paint would be equivalent to two coats of lead paint.

Mr. Hooper remarked, that oxide of zinc paint was at present sold in London, and he believed the oxide of zinc used in making it was imported from abroad. This, at least, he knew to be the case with the paint prepared at one manufactory.

Mr. Scanlan had been engaged some years ago in some experiments on the preparation of oxide of zinc by combustion; his object having been to effect the oxidation by causing a current of hot air to pass over the surface of melted zinc. The results, however, had not realized his anticipations.

Mr. Bell had tried, in the preparation of zinc ointment, some of the oxide of zinc made by combustion as a substitute for that made in the usual way by precipitation and calcination, but found that in the state in which he had received it, it was not sufficiently smooth and impalpable. It required to be treated by elutriation before being used, so as to remove any minute particles of metal that might remain mixed with it.

Mr. Redwood thought that some benefit would result from the discussion of this subject, by its affording an opportunity for again directing the attention of the retail Pharmaceutist to the impurity of much of the oxide of zinc of commerce. He (Mr. R.) had read a paper before the Society some years ago on this subject, the object of which was to show that nearly all of what was met with in commerce and used in medicine as oxide of zinc was either carbonate of zinc or basic sulphate of zinc, containing only from 64 to 67 per cent. of the oxide. Since that period manufacturers had prepared the true oxide of zinc according to the Pharmacopœia; but he was given to understand that in a great majority of cases the retail Pharmaceutists still purchased the impure preparations, either on account of their being cheaper, or because the colour and

appearance is more in accordance with what they have been accustomed to. The oxide of zinc made according to the Pharmacopœia has a slightly yellowish colour, while the other preparations are white.

ON CALAMINE.

BY MR. JACOB BELL.

The impurity of the calamine usually met with in commerce has long been notorious, and the attention of Chemists was especially directed to the subject by Mr. Moore, who examined six samples of it in the laboratory of this Society. Of these samples (which were obtained from different sources) five contained no zinc, and the sixth was contaminated with nearly forty per cent. of foreign matter. Since the publication of the paper of Mr. Moore, various inquiries have been made for a genuine calamine, and my object in bringing forward the subject is to furnish the result of my own investigation in reference to it.

In order to ascertain whether the same adulteration prevailed on the continent, it occurred to me that it would be desirable to obtain specimens from Paris. Six samples having been procured for this purpose at some of the most respectable shops, they were found on examination to be fair specimens of calamine, although differing in colour, and not prepared in the manner required for use in this country.

There is reason to believe that the compound sold as calamine in England, is not always mixed designedly as a fabricated article, but that it is another native mineral, which occurs in the same localities, and is substituted for the true calamine either accidentally or habitually, on the principle that no complaint being made, it is supposed to give general satisfaction.

In confirmation of this opinion, the specimens on the table, recently obtained from Derbyshire, will serve to point out how easily such a mistake might occur, viz.,

1. Native carbonate of zinc, or calamine, in its usual state.
2. A large specimen of the same.
3. Crystallised and common calamine, with minute cubes of fluor spar.
4. Green or cupreous calamine, with dark dog-tooth, or calcareous spar.
5. Cadmiferous calamine with stalactitic.

With these may be compared the following also from Derbyshire, some of which at first sight might be supposed to resemble the former.

6. A large piece of massive calciferous sulphate of barytes polished.
7. A stalactite of ditto.
8. Ditto, coated by lateral crystals of the pure sulphate (rare).
9. A specimen as usually found.
10. A section polished.
11. A massive piece of common barytes (cauk), the Dutch lead of commerce, and the false calamine of the shops.

The last of these specimens is contaminated with a sufficient quantity of iron to give it a colour not unlikely, when powdered, to be mistaken for that of calamine, and if taken on trust, without chemical examination, its frequent occurrence in the market is easily accounted for: in fact, the spurious article has a brighter and more "popular" colour than the genuine, which has a dull dirty brown tint.

The real calamine is more expensive than the minerals usually substituted for it, but the difference is not enough to furnish an inducement to continue the practice, if a demand prevailed for the genuine article. The remedy is therefore in the hands of the trade, and the publication of the fact among those who supply calamine wholesale is likely to have a salutary effect.

The specimens were obtained from Mr. Adam, of Matlock, who on application, readily furnished the information desired, and sent half a ton of real calamine, of which No. 1 is a sample, observing, that he could supply it at a lower rate *in quantity*, if the half ton sent as a specimen should be found to answer the purpose.

The examination having proved satisfactory, it might have been supposed that the difficulty was at an end, but this was not the case.

The Pharmacopœia contains the following directions for *Calamina Præparata:—*

"Burn the calamine, then bruise it. Afterwards let it be made into a very fine powder in the same manner as we have directed chalk to be prepared."

It would be obviously indiscreet to entrust this process in the hands of the parties accustomed to supply what is called Calamine to the trade, and the erection of the requisite apparatus for this purpose would be attended with considerable expense besides interfering with regular business. This obstacle would no longer exist, if a regular demand should arise for the genuine calamine. It would not answer the purpose of the retail consumer to embark in this manufacture, but an opportunity exists for any manufacturing Chemist who may feel disposed to assist in rectifying the abuse, which has for so many years been a disgrace to the trade in reference to this preparation.

Before dismissing the subject it may be as well to suggest a question for the consideration of Chemists, namely, in what respect is the native calamine superior to the oxide of zinc in its pure state? The preparation in which calamine is chiefly, if not exclusively, used, is *ceratum calaminæ*, or Turner's cerate: and the substitution of pure oxide for calamine would amount to no more than the abstraction of the adventitious impurities which inevitably occur, to a greater or less extent, in a native product. This question must be decided by the College of Physicians, as it is quite clear that as long as *ceratum calaminæ* con-

tinues among the preparations in the Pharmacopœia, every Chemist should be provided with genuine calamine. To promote this object, the subject is introduced to the meeting this evening. The specimens are at the service of the Society, having been obtained for the museum, and the half ton of calamine is waiting for the word of command of the first enterprising Chemist who may be disposed to undertake to prepare it according to the instructions of the Pharmacopœia.

Mr. Midgley stated that many years ago he had directed his attention to the impurities in commercial calamine. He found on enquiry in the mining districts where calamine was found, that the miners applied the name calamine to two minerals, they called the native carbonate of zinc *brass calamine*, and amorphous sulphate of baryta they called *common calamine*, or *barytes calamine*. As the former of these was the dearest, and as there was always a demand for it for making brass, it had become the practice to substitute the other for use in medicine. He believed the true calamine was much more efficacious than the other when used in Turner's cerate.

Mr. Squire thought the use of calamine in medicine might be very well dispensed with, and pure oxide of zinc substituted for it.

Mr. Alexander Ure coincided in the opinion that for medicinal use oxide of zinc might be substituted for calamine. He considered it of great importance that the oxide should be in an impalpable powder.

Mr. Morson thought it very questionable whether a white Turner's cerate would satisfy the public, who had so long been accustomed to look upon the colour as characteristic of this preparation. In the provinces, where large quantities of this ointment are used, he anticipated that there would be a strong opposition raised to such an innovation, by that important class, the old ladies. It was true that some colouring matter might be added to assimilate it to the old preparation, and as true calamine, when prepared according to the Pharmacopœia, was principally a mixture of oxide of zinc with a little oxide of iron, this latter oxide would be the best colouring agent to use.

Mr. Fordred remarked, that before the experiments of Mr. Moore were published, he had frequently examined specimens of commercial calamine, and had invariably found them to consist principally of sulphate of baryta.

Mr. Redwood thought it was due to the Wholesale Druggists to state, that they were not the parties by whom the substitution of sulphate of baryta for true calamine was made. He had inquired from several sources, and found that there was a large manufacturer of calamine at Derby, from whom either directly or indirectly, most of the commercial calamine was obtained, and

the other parties dealing in it, had not, until the subject was recently mooted, been aware of the real composition of the commercial article.

CORUNDUM FILES.

A NOTE was read from Mr. Bartlett, accompanying some specimens of corundum, which he had applied in the formation of files and wheels for cutting glass apparatus. He thought that these instruments would be found to answer better than the common files, the corundum possessing very great hardness. The files and wheels were made by attaching the powdered corundrum with cement to the surface of wood.

PORTRAIT OF THE TREASURER.

The Chairman announced the presentation to the Institution of the Portrait of the Treasurer of the Society, R. H. Pigeon, Esq.

A specimen of an improved kind of collodion was put on the table by Mr. Fordred.

LIST OF MEMBERS, ASSOCIATES, AND APPRENTICES (*continued*).

Elected in December.

MEMBERS.

COVENTRY	Foster, Henry James,	Crop Cheaping
LONDON	French, Joseph B.,	10, Pall Mall
MARGATE	Kinch, Francis,	16, High Street

MAJOR EXAMINATIONS.

Archer, William	Snaith
Brocklesby, David Hyde	10, Moore Place, Kennington Road
Corbould, George Giles	Bristol
Evans, Henry Sugden	60, Bartholomew Close
Greaves, Edward	Haversham, Bucks

MINOR EXAMINATIONS.

Brown, Robert Thomas	London
Day, Charles W. H.	High Street, Woburn, Beds
Furze, Henry	Richmond
Groves, Richard Henry	Shepton Mallet
Hepple, Henry	Bideford
Manning, Richard James	Cowes
Robson, Joshua Hutchinson	Norwich
Wallworth, David	Congleton

REGISTERED APPRENTICES.

APPRENTICES.	RESIDING WITH	TOWNS.
Harrison, Henry	Mr. Kershaw	Southport
Sidford, Edmond	Mr. Squarey	Salisbury
Toovey, Richard	Mr. May	Reading
Whitwell, John Herring	Mr. Wiggin	Ipswich
Withers, Frederick J.	Mr. Owen	Exeter

REVISION OF THE LIST OF MEMBERS.

In accordance with the bye-laws of the Pharmaceutical Society, which require that persons ceasing to be Members shall return their Diplomas or Certificates of Membership, the Council have issued a circular to those whose subscriptions were in arrear. The issue of this circular had been deferred for a considerable time in the hope that the usual communication of the Secretary would have the desired effect in a great majority of cases; but the Council, feeling that in justice to those who regularly contributed their share of support to the institution, they could no longer postpone the adoption of the course prescribed by the bye-laws in reference to defaulters, have issued the circular, of which the following is the result up to the 12th of December:—

Number of defaulters, August 1st, 1848		763
Arrears paid up in consequence of circular . .	70	
Promised to pay	11	
Deferred	13	
Dead	86	
Left business	84	
Left the towns	58	
Diplomas lost	6	
" returned	108	
		436
Unsettled		327

TRANSACTIONS OF THE BRISTOL CHEMISTS' ASSOCIATION.

AUTUMN SESSION, 1848.

INTRODUCTORY ADDRESS.

BY DR. G. D. FRIPP,
Physician to the Bristol General Hospital and the Clifton Dispensary.

(*Continued from page* 287.)

There is yet another bearing which educational improvement has upon your relations to the medical profession, which I cannot wholly pass over;—and it applies to the dispensing department of your business. Though I should be sorry to think such things were done in any respectable establishment—and I am sure they would not be sanctioned by the heads of such establishments—yet both my own experience, and that of others, compel me to believe that preparations, supposed, no doubt, by the dispenser to be equivalent to those ordered by the prescriber, are occasionally substituted in place of the latter. I have before alluded, though not in express terms, to these substitutions, when speaking of the extent to which a Physician's success and credit are oftentimes placed in your strict

honour and integrity; and I believe I was right in appealing to your sense of honour as that which should guard him against this source of annoyance, to say the least of it. But such things, when they do occur, happen, I am very sure, from want of that more just appreciation of the properties of medicines, which a general improvement in the preparatory studies of the dispensing chemist would give or suggest to him,—and of that greater caution which always accompanies greater knowledge. Little can those who dispense the prescriptions of the medical attendant, know of the particular reasons why one bitter infusion is preferred by him to another, one cathartic to another, or one form of an active remedy to another, and how seriously any reversal of his intentions may disappoint his expectations, and be prejudicial both to his reputation with the patient and to the patient's own welfare. But more knowledge would suggest the possibility of these events, and be a great safeguard against their occurrence. I will only add, that similar observations apply also to the subject of exact and conscientious adherence to the precise *quantities* ordered; an apparently most trivial deviation from these being often productive of serious consequences, not dreamt of by the youth who trusts to his eye when he ought to rely only upon the balance.

But, amongst the incentives to educational improvement, I have yet to speak of your relation to the public—and herein I particularly allude to the protection they expect, and ought to find in a respectable Chemist and Druggist, from the risk of being supplied with adulterated or inferior drugs and chemicals. This is a matter in which they are entirely without security, except through their confidence in your honour and knowledge; and it is unnecessary to observe, that the former, without the latter, avails, in this instance, but very little. Now I believe that adulterations do actually exist to a less degree than once they did, and that they are less frequently met with in this country than in some others. I fear, however, that, from this circumstance, many Chemists are induced to believe that they may rely with entire security on their medicines, provided they themselves purchase from respectable houses, and that any great degree of acquaintance, either with the distinctive characters of genuine drugs or the mode of testing chemical substances, so as to ascertain their purity, is consequently unnecessary. Yet it is notorious that drugs of very different qualities are kept—knowingly—and also that many adulterations are practised, and many impure chemicals prepared. Though no "apothecary" would now dare "shew the censors," as Dr. Murett says was done in his days (180 years ago) "myrtle-leaves for senna, mushrooms rubbed over with chalk for agaric, hemlock for pœony," or, more fatal substitution still, "sheep's lungs for fox's lungs and the bone of an ox's heart for that of a stag's heart,"—yet there is no doubt that many a respectable Chemist would be found to be the unconscious possessor and vendor of adulterated senna, or scammony, or opium, or ipecacuanha, or rhubarb, or jalap, or elaterium. The whole catalogue of things sold in powder as well as of essential oils, is open to exception of this kind; and various chemical ingredients used in medicine, of which it may be sufficient to cite as examples, iodide of potassium, iodine itself, white precipitate of mercury, nitrate of silver, benzoic acid, valerionate of zinc, and the more costly alkaloids, are found in most fluctuating degrees of purity. So greatly does the purity of strychnine vary, that I was myself the subject of a precisely similar experience to one recorded by Dr. Christison as happening to him. A patient of mine, who had been taking this medicine without obvious effect, became immediately affected with frightful tetanic spasms on using the *same doses* supplied from a *different source.* On the vast importance of this subject, and the proportionate increase of this with the activity and energy of any given

agent, it were most superfluous for me to insist. But is it not clear, then, that those who are the immediate purveyors of medicinal substances to the public, should be thoroughly qualified, by a knowledge of materia medica and of chemistry—in other words, by an acquaintance with the physical and chemical characters of all the articles of the materia medica and of the preparations of the Pharmacopœia,—to know the spurious from the genuine, the good from the inferior article, and to analyze and test the chemical substances he uses? Unless, then, it can be said that our Pharmaceutists are already possessed of all this knowledge—and this, I believe, without any blame to those who have not had the opportunities necessary for its acquisition, must be denied,—a clear case is made out, on the ground of your relations to the public as well as to the profession, for an improved standard of professional education.

I have now detailed some of the principal motives and objects which may be supposed to actuate you in endeavouring to obtain a higher educational status; and these I have derived—from the circumstance of your art being directly based upon scientific principles—from the natural desire to elevate one's individual position as well as that of our profession in the scale of social rank,—from the discrepancy which the daily increasing applications of chemistry make but still more apparent, between your name and your actual professional character,—from the necessity of such internal improvement, in order to obtaining that protection from unqualified persons which is desirable, no less for the public than for yourselves,—and, from the claims arising out of the relation in which you stand to the medical profession on the one hand and to the public on the other. I am now about to tread on more tender ground, and to allude to a further reason, why, to myself, such a movement as that in which you have engaged yourselves seems desirable; though, I am well aware, that the ultimate effect I anticipate from it, would by many of my medical brethren, and perhaps by yourselves, be questioned or denied, and that, by some of yourselves, a different view may be taken as to its desirableness. The result to which I refer is, a more complete and definite line of demarcation between *your* duties and engagements, and those of any class of medical practitioners. Every body knows that there is a sort of border territory between the Chemists and Druggists on the one hand, and one class of general practitioners on the other, which gives rise, as border territory is always too apt to do, to bickerings and heart-burnings, —to little disputes as to where the boundary actually lies—and to mutual incursions into what either party considers his rightful province. Now to arrive, if possible, at a mutual good understanding on this matter, I shall presume, will be acknowledged, by all parties, to be a desirable object; and my own impression is, that this object will be forwarded, at any rate, by the introduction of a better and more scientific education amongst the Pharmaceutical body. I am told, there are some of the general practitioners who regard your doings with jealous watchfulness, fearing that they will but lead to still further encroachments. I think their fears are groundless. I augur from a greater diffusion of chemical knowledge among your body, a more complete concentration of your attention upon your immediate duties, and upon those pursuits which are directly connected with the subjects you have systematically studied. The greater exactness and minuteness of attainment, in one branch of science, will of itself suggest wholesome doubts of ability in any other, which may not have been made the object of similar careful and regular study. It is one of the well-known results of thorough and sound knowledge, that it opens the mind to perceive its own ignorance, and therefore it engenders caution: while, on the other hand, to make a somewhat hackneyed quotation, which we shall all be the better for remembering, "Fools rush in where wise men dare not tread."

From these observations you will have inferred that I participate in the objection, which is taken generally by members of my profession, to the Chemist and Druggist acting as a medical practitioner. And so I do—though not to the extent, probably, that some would go. "*Abrotanum ægro Non audet, nisi qui didicit dare*," says Horace, contrasting the general conceit, that every body, whether learned or unlearned, could write verses, with the commendable way in which, in all other vocations, each man kept to his own line. "No one thinks of venturing so much as to administer *abrotanum* to the sick except he has been properly instructed." And of the *principle* herein implied I cannot but believe you will all agree with me in owning the justice. Now I do not mean to contend for such a strict carrying out of this rule as would prevent those employed in the dispensing of medicines, and who must and ought to be acquainted with the general properties of medicines, from ever, on their own responsibility, recommending a dose of medicine. Far from it. All I would insist on—and this most strongly—is, that they should do this only when asked, declining rather than courting the office of medical adviser; and never do it at all, when their own good sense and knowledge suggest to them the probability that the applicant has any serious disorder. And this simply because, without extensive and careful study of disease, under the lights of all needful preliminary knowledge, it is *unsafe* to presume on our being able rightly to interpret symptoms. And for myself, I believe they are more likely to act thus in proportion as they are better instructed.

It may not be amiss to recall to mind the history of the Chemists and Druggists, as a distinct body, and to remember that they occupy the very place which the original Apothecary did, when he was the assistant of the Physician, solely for the purpose of compounding and sometimes administering the medicines which the latter prescribed. Now, by degrees, the Apothecary assumed the functions of the practitioner of Physic, and ultimately became the General Practitioner, keeping an open shop and surgery. Meanwhile, the wants of society, which had encouraged this development of an order of medical men distinct from the Physicians and Surgeons, provided also a new order of men to take the place of those, who, by adding to their Pharmaceutical operations the cares and labours of Medical Practitioners, had ceased to discharge the former in a way which satisfied either the Physicians or the public—and this new order was the Chemist and Druggist of the present day. From this little bit of medical history, it strikes me a lesson might be profitably learnt, both by the General Practitioner and the Chemist. The former might see that it is better to leave Pharmacy, except, at farthest, for the purpose of supplying his own patients with medicines, to the Pharmaceutist; and the latter might learn that, deviation from the strict line of his pharmaceutical duties, with the slight exceptions hinted at just now, is likely to injure his position as a Chemist and Druggist.

I must confess that so long as any qualified Medical Practitioners keep *open shops for the sale of drugs*, they, at least, have no right to complain, though the Druggist should not only give advice across the counter, but even visit patients. But I hope the former hybrid sort of practice will not long be allowed to continue: and I would go farther, and express a wish, that no Medical Practitioner would practise Pharmacy at all *in large towns*, where there is every opportunity for carrying out a complete division of labour. There are numerous reasons why, for the sake of my own profession, I should desire to see this separation; but here, and on the present occasion, it is not fitting I should allude to any others than those in which you also are concerned; and you will allow that such a course would furnish additional claims to the Medical Practitioner, for expecting that you would confine yourselves, as strictly as possible, to your particular department. And I believe that your doing this now,

would contribute greatly to bringing about the other desirable arrangement in which you are directly interested ; for it would at once remove some of the strongest reasons I have ever heard urged, by those practitioners who dispense their own medicines, in favour of that mode of conducting their business.

I proceed now to say a few words on the means which appear desirable for attaining the objects of your association.

I presume that, with reference both to the more social and the educational objects of your society, periodical meetings for friendly converse and discussion *form a part of* your plans. I think great good results from meetings of this kind in every way. Science is itself often advanced through these means ; and still more valuable are they to those engaged in the prosecution of any special study or pursuit. As the immortal Bacon says—"Certain it is, that whosoever hath his mind fraught with many thoughts, his wits and understanding do clarify and break up, in the communicating and discoursing with another ; he tosseth his thoughts more easily ; he marshalleth them more orderly ; he seeth how they look when they are turned into words ; finally, he waxeth wiser than himself ; and that, more by an hour's discourse than by a day's meditation." Such encouragement have you from one of the wisest men who ever lived, to expect benefit from the mutual communication and interchange of ideas. I need not enlarge on this, or take trouble to show, how the comparison of experiments tends to their verification;—how the observation of one man is corrected by that of another;—how unworthy attempts at keeping secret processes and facts which are for the common good, are nullified, and the diffusive tendencies of science are given effect to, through the instrumentality of meetings of this kind.

But in addition to meetings for conversation and discussion, others for the delivery of formal Lectures are no doubt desirable. I see by the account of your proceedings in the Pharmaceutical Transactions that you have been pretty largely furnished, during your past session, with discourses of this class. I am truly glad to recognise, in the list of contributors, an evidence of the interest which has been taken in your Institution :—and yet greater pleasure does it give me to observe in three or four of the reports of lectures themselves, proofs of the great ability possessed by some of your own members. And if I may venture a friendly hint, it would be one in encouragement of those Lectures from members of your own society, rather than from others ; or, at any rate, upon subjects more akin to your special pursuits than some of those which were brought before you in your last session. With respect to Lectures, however, the greatest benefit arising from them must, I think, be to the younger portion of your body—chiefly to the apprentices and pupils, through *whose* improved education you must mainly look for that general advancement of your profession which you are seeking ; and this leads me to offer a few observations, which I somewhat eagerly take the opportunity of doing, on the establishment of Schools of Pharmacy. Now I would at once say, that nothing you could possibly do seems to me so much calculated to further the highest ends you have in view as the setting up schools of this kind in large provincial towns, whereby the young men who are learning their business in those places, might have the opportunity of a thorough scientific training, during the whole of their pupilage. I understand that at present those desirous of attaining the distinction, which all should seek, of membership of the Pharmaceutical Society, proceed to London after the termination of their apprenticeship, and there avail themselves of the advantages of the school established by that society. This appears to me to be a very close parallel, in every respect, to what used to be the custom in the education of young men for the medical profession —and like it, to be a complete putting of the cart before the horse. The

pharmaceutical student is thus, as the medical student used to be before the establishment of provincial schools, first instructed in the practical department of his profession, the *principles* of which he has to learn afterwards. Now there seems to me to be every reason why this course should be reversed. The knowledge to be gained at Schools of Pharmacy must, I feel assured, be of far greater value at the beginning than at the end of the apprentice's career. Surely it were better for him to be instructed in *Botany* and those parts of *Natural History* which are necessary to an intelligent acquaintance with the objects of the materia medica, at as early a period of his actual use of these substances as possible; besides that the facilities for studying botany are much greater in the country than in London. Again, if it be true, as you will readily allow, that *Chemistry* is the very *foundation* of your art—that no pharmaceutical operations can be properly understood without its aid, and that their successful practice wholly depends upon a knowledge of its laws, while it is equally necessary to enable the student to understand the constitution of the acticles of the materia medica, ought not the pharmaceutical student to be *first* of all initiated into its principles? and if in its principles, will not the same reasons hold good for his early practical instruction in the *Laboratory* also? and in the special application of practical chemistry to medicine—in other words, in *Pharmacy?* And if Botany and Chemistry as preliminary to materia medica, should come thus early under his notice, instruction in the *Materia Medica* itself, *i. e.*, so far as is exclusive of therapeutics, and specially adapted to the Pharmaceutical rather than the medical student, should, for similar reasons, follow at no distant interval. Here then I have enumerated the whole circle of subjects necessary to be treated in a School of Pharmacy: and each of them presents itself as a study on which it is most desirable that the pupil's attention should be engaged, as soon after his introduction into a Chemist's establishment, as the order in which they should be severally taken up will allow. I will just add, that in order to the thoroughly successful prosecution of these studies, he should have been previously well taught in elementary mathematics, including algebra; and that for other reasons, a moderate acquaintance with the Latin language should be considered indispensable. Some test of these preliminary acquirements should therefore be instituted at the very outset, and the apprentice should have the opportunity of immediately commencing the scientific part of his education in a Pharmaceutical School. But, I anticipate among other possible objections to the establishment of such schools, this very practical one, that they will never pay—that the expense of them will never be balanced by the fees of the students. Now I have been in some degree influenced in saying what I have on the subject, by the wish to suggest the outline of a scheme which has more than once occurred to me, and by means of which I am sanguine enough to think that the ultimate attainment of this object may be facilitated, with advantage also to another class of institutions in which I take great interest, I mean Provincial Medical Schools.

It may be known to you that Lectures upon all the subjects I have enumerated (and which I believe correspond to those comprehended in the arrangements of the school of the Pharmaceutical Society), with the exception of Pharmacy, are comprised within the scheme of the Medical Schools. And all that would be necessary to adapt the Lectures delivered at the latter institutions to the purposes of the two classes of students, Medical and Pharmaceutical, would be, a little recasting of them, which would, I am thoroughly persuaded, be of great advantage to the medical students themselves. The view has been long entertained by myself, and is, I know, shared by some other medical teachers, and amongst them by some of considerable influence, that it would be a great improvement, in the education of medical students, if Chemistry and Botany were taken

out of the list of subjects strictly belonging to the medical curriculum, and that an acquaintance with these should be attained and tested, before the professional education is commenced. I see no reason, then, why these subjects should not be studied by all, who intend afterwards entering as strictly medical students, in the schools of Pharmacy, which I would propose to annex to the schools of medicine, so as to diminish the expense of two separate establishments. Then, the Lectures at present delivered on Materia Medica and Therapeutics, conjointly, in the medical schools, might be re-arranged in two courses, with great advantage ; the one course, adapted for all the requirements of the Pharmaceutical student, and occupied with Materia Medica, proper, and serving to the medical student as introductory to the other course, which should be Pharmacological, rather than Pharmaceutical, and including Therapeutics, be adapted for the medical students alone. A separate course of Pharmacy might be open to both classes of students, and would, I am persuaded, if arranged so as to include practical instruction in dispensing of medicines, (as it might very well be,) be attended by a large number of medical students, who, now that the habit of living as pupils in the houses of general practitioners, who dispense their own medicines, has passed very much into desuetude, would, I imagine, gladly avail themselves of this mode of acquiring the knowledge and certificate they are required to obtain with respect to this subject. Such a scheme as I have suggested, would, in fact, go to the constituting certain of the preliminary courses now delivered in medical schools, with one additional course, into schools of Pharmacy, which might be annexed to, or become the Pharmaceutical departments of, such medical schools. Whether the hint is worth further consideration, I leave to you to determine ; but should you think it so, it would then become expedient that your own Society and any similar ones in other places, should confer with the teachers of medical schools, with a view to a mutual discussion of its desirableness and practicability. I think it necessary to add, in order to prevent possible misapprehension, that I have not spoken on this matter to any of my late colleagues in the medical school of this city, and must not, therefore, be supposed to express any more than my individual sentiments.

And now, gentlemen, in bringing this, I fear, already too lengthy address to a close, suffer me yet once more to advert to a topic partially alluded to already. I feel disposed to linger over the high claims of that branch of science, which is more peculiarly yours. How lofty its design—the interpretation of that sphynx-riddle, the nature of things ! How admirable its use as a discipline and training for the mind in search of truth ! And in this point of view how highly deserving your appreciation. It is impossible to be a chemical philosopher, without becoming conversant with those laws of inquiry, which, as Dr. Thos. Brown says, "regulate our search of truth in all things, external and internal." How peculiarly interesting, too, the present aspect of chemical philosophy;—in a condition evidently transitional, and full of suggestions of great truths on the eve of discovery. What words, pregnant with further results, are those of catalysis, isomerism, isormophism, allotropism ?—implying facts which would strangely startle any one who should have fallen into a Rip van Winkle slumber, soon after the dazzling light of Dalton's discoveries had seemed to usher in a new and *permanent* æra in the science, and who had now waked up to be told that decompositions may be effected by the contact of bodies which themselves undergo no change ; that a long array of substances has been discovered, consisting of identically the same elements and in the same exact proportions, and yet which differ as widely in their respective characters, both physical and chemical, as things the most dissimilar in their composition can do ; that elementary bodies, instead of possessing fixed properties, may assume different conditions, in

which (as typified in the strange phases presented by carbon in charcoal, plumbago, and the diamond), both chemical and physical characters have undergone a great change ; so as even to revive the old and magnificent dream, that all the so-called elements may be found resolvable into one.

Surely, it is a great privilege that with your practical pursuits should be connected, by the most legitimate alliance, that of a science, so wide in its scope, so rich in ascertained results, so surpassingly interesting in its present position, so altogether worthy to employ in its investigation the highest order of intellects. What stronger inducements need I,—could I offer your younger members, to assume, as a body, the scientific character which your professional designation implies—to determine upon being more than *mere* tradesmen, not by any means neglecting the needful attention to the details of your business, which, it is a vulgar mistake to consider, unfit a man for higher pursuits ; but being at once good men of business and something more also; cultivating your valuable and important art, in that enlarged spirit, which avails itself eagerly of every opening through which the light of science beams upon it, and which, loving knowledge for its own sake, finds in the mere search after truth, a reward so great, so lasting, and so pure, that, while a man is thereby elevated above the influences of a sordid ambition, he is to a great extent compensated for possible disappointments of his just expectations, and realises a larger amount of happiness and solid enjoyment than any extent of success in the race after riches and honours could ever pour into his bosom.

BIRMINGHAM PHARMACEUTICAL INSTITUTION.

First Anniversary Meeting, held at the Stork Hotel, Old Square, Nov. 3, 1848,

Mr. W. Southall, President, *in the Chair.*

EXTRACTS FROM THE REPORT.

Gentlemen,—The first year of the Birmingham Pharmaceutical Institution having terminated, it becomes the duty of the Committee to present you a Report of their proceedings, and this duty is rendered the more agreeable, as, upon referring to the minutes of transactions, it has been found that the Institution has made steady progress from its foundation to the present time.

The early career of every institution for the advancement of art or science is invariably beset with difficulties, which, notwithstanding the most persevering labour, require much time to overcome ; and whether we take a retrospective view of what has already been accomplished, or contrive plans for the future, certain contingencies must be duly allowed for. Under all circumstances the Committee congratulate you on the prosperous condition of your Institution at the present time, as will appear from the subsequent portion of this report.

In the laws of the Institution, its objects are stated to be, " to facilitate the acquirement of a knowledge of Pharmacy and the sciences with which it is connected ; and to promote the diffusion amongst Chemists and Druggists of any kind of knowledge that may be useful to them in their trade ;" and these objects are proposed to be attained by the establishment of a library, lectures, and meetings of the members for reading scientific papers, &c.

Endeavouring to carry out these views, the Committee directed such a portion of the funds as they considered advisable to be appropriated to the purchase of books, and the library was opened to the members on the 20th of December, between which date and the 30th of September, two hundred and forty-six entries were made in the register of books taken out.

Although the number of books is at present but small, it includes some of the most approved standard works on each department of Pharmacy, and the collateral sciences.

During the past year two courses of six lectures each, have been delivered at the Philosophical Institution: one on Chemistry, by Professor Shaw, in January, February, and March, was attended by thirty-three students; and the other on Botany, by Professor Knowles, in May, June, and July, was attended by thirty-nine. These numbers indicate that considerable interest must be taken in the study of the two sciences; but a great hinderance to regular attendance has been found to arise from the late hours of business, especially during the summer. In the ensuing year it is proposed to restrict the lectures to the winter season, and it is requested that principals will afford their assistants and apprentices every convenient facility for attending them.

Arrangements have been made with Professor Shaw to deliver fifteen lectures, on the Chemistry of the Inorganic Preparations used in Medicine, which the Committee anticipate from the Professor's well known ability as a lecturer and a scientific Chemist, will prove of great practical value.

The first meeting for reading scientific papers was held at the Philosophical Institution, in April, when an address to the Members was read by the President. Three meetings were subsequently held in May, June, and July, at which, as well as at the meeting in April, papers on various Pharmaceutical subjects were read, and collections of fresh medicinal plants exhibited.

The Committee feel pleasure in acknowledging their obligation to several members of the medical profession, who have honoured the meetings with their presence. The duties of the Pharmaceutist constantly require his co-operation with the Medical Practitioner; hence the importance will be seen of the latter being consulted with, in every attempt to introduce improvements in Pharmacy; and it need scarcely be remarked how great public advantage might be derived from a more general and regular intercourse between the members of the two professions.

According to the 6th law, regulating the election of the Committee, the following gentlemen have been chosen by lot to continue in office a second year:—Mr. W. Southall, Mr. Cattell, Mr. Banks, Mr. W. Southall, jun., Mr. Hardy, and Mr. Horncastle.

Chemists and Druggists have always, as a body, been regarded as occupying a position in society next in order to the learned professions, and indeed, such an acquaintance with science and the usual subjects of a professional education is necessary for the competent discharge of their duties, as would fully entitle them to that rank. All our members must be aware, however, that the position we have to preserve is not a stationary one—we see from the rapid advances of all classes in intelligence, that to maintain our rank we must be continually progressing—the professional knowledge of our predecessors has become the common knowledge of our cotemporaries; and it will be the duty of the coming generation of Pharmaceutists to apply the multitudinous discoveries which science *has* already made and *is* still making to the further improvement of their art. Such are the increasing demands upon our skill; and are we to neglect and despise the obvious means by which they may be satisfied? Would it not be more pleasing as well as more profitable to do that which is required of us? The business we make choice of we are morally under an engagement to conduct with our best ability, and we may feel assured that we shall not be allowed to neglect this obligation with impunity.

It will, perhaps, be permitted us to remind you of some of the principal advantages of societies. In the first place, the property, and to a certain extent, the intelligence of the whole are at the service of every member.

It will afford an illustration of the manner in which each may derive benefit, if we suppose the case of some person in search of information upon any particular subject. How is he to obtain it? If he has no one to direct him in the inquiry, he may search through volume after volume, and spend weeks, or even months, in fruitless labour; whereas, by simply propounding the question to a society, the information might be obtained immediately. Every one who has been accustomed to study by himself, must at times have felt the want of assistance, which would have saved much valuable time, and have conducted him with ease through difficulties that have nearly determined him to throw up his task in despair. Another use of societies is, the stimulus given to thought by the associating and conversing together of a number of persons. It has been observed by those who have studied the operations of the mind, that by expressing our thoughts we give them permanence and fix them in the memory, and when several persons are brought to think upon the same subject, there is less liability to error, for if a few are led away by any prejudice, others who are not so biassed will be able to correct them.

ORIGINAL AND EXTRACTED ARTICLES.

ON THE EQUIVALENT OR COMBINING VOLUMES OF SOLID BODIES.

BY GEORGE FOWNES, ESQ., F.R.S.

The first volume of the works of the Cavendish Society, of which a general review appeared in the November number of this Journal, contains, as there noticed, two important and interesting memoirs on the above subject, namely, a report by Professor Otto, of Brunswick, being a summary of the results of the labours of MM. Kopp, Schroeder, and others of the earlier continental experimenters; and a paper by M. Filhol translated from the *Annales de Chimie et de Physique*,* containing a number of new determinations of the specific gravities of various substances, of great importance to the theory of combination by volume. The inquiry itself being one which at present excites great interest, while the circulation of the volume containing the papers referred to is limited to the members of the Cavendish Society, a notice of some of the principal facts which have yet come to light may not prove unacceptable to the reader.

The researches under consideration constitute an attempt to extend to solids and liquids the law regulating combinations among gaseous bodies discovered many years ago by M. Gay-Lussac, in virtue of which chemical union among these latter always takes place between equal volumes of the combining gases, or between volumes which bear a simple relation to each other. It is further invariably observed, that the contraction of bulk which so frequently follows combination, itself also bears a simple relation to the volumes of the combining gases. The consequence of this is that compound gases, aud the vapours of complex volatile liquids (which are truly gases to all intents and purposes) follow the same law as elementary bodies, when they unite with these latter or combine among themselves.

The ultimate reason of Gay-Lussac's law is clearly the remarkable

* Third Series, xxi., 415.

relation established by the hand of Nature, between the specific gravity of a body in the gaseous state and its chemical equivalent; a relation of such a kind that quantities by weight of the various gases expressed by their equivalent numbers, or in other words, quantities by weight which combine, occupy under similar circumstances of pressure and temperature either equal volumes, or volumes bearing a simple proportion to each other.

If both the specific gravity and the chemical equivalent of a gas be known, its equivalent or combining volume can be easily determined, since it will be represented by the number of times the weight of an unit of volume (the specific gravity) is contained in the weight of one chemical equivalent of the substance. In other words, the equivalent volume is found by dividing the chemical equivalent by the specific gravity. The subjoined table of the principal gaseous elementary bodies is thus constructed.

	Sp. gravity.	Equi. weight.	Equi. vol.
Hydrogen	.0693	1.	14.43
Nitrogen	.972	14.	14.40
Chlorine	2.470	35.42	14.33
Bromine-vapour	5.393	78.26	14.51
Iodine-vapour	8.716	126.36	14.50
Carbon-vapour (hypothetical)	.418	6.	14.34
Mercury-vapour	7.000	100.	14.29
Oxygen	1.1057	8.	7.23
Phosphorus-vapour	4.350	31.38	7.21
Arsenic-vapour	10.420	75.21	7.21
Sulphur-vapour	6.654	16.09	2.418

Thus it appears that hydrogen, nitrogen, chlorine, bromine, iodine, carbon, and mercury in the gaseous state, have the same equivalent volume; oxygen, phosphorus, and arsenic one-half of this, and sulphur one-sixth. The slight discrepancies in the numbers result chiefly from errors in the determination of the specific gravities.

Compound bodies exhibit exactly the same results:

	Sp. gravity.	Equiv. weight.	Equiv. vol.
Water-vapour	.625	9.	14.40
Protoxide of nitrogen	1.525	22.	14.43
Sulphuretted hydrogen	1.171	17.09	14.59
Sulphurous acid	2,210	32.09	14.52
Carbonic oxide	.973	14.	14.39
Carbonic acid	1.524	22.	14.43
Light carburetted hydrogen	.559	8.	14.31
Olefiant gas	.981	14.	14.27
Binoxide of nitrogen	1.039	30.	28.87
Hydrochloric acid	1.269	36.42	28.70
Phosphuretted hydrogen	1.240	34.38	27.72
Ammonia	.589	17.	28.86
Ether-vapour	2.586	37.	14.31
Acetone-vapour	2.022	29.	14.34
Benzol-vapour	2.738	78.	28.49
Alcohol-vapour	1.613	46.	28.52

Strictly speaking, some of these compounds have no true chemical equivalents, inasmuch as they form no direct compounds. In these cases the equivalent is deduced from the formula commonly assigned

to them, which must stand in some very simple relation to the real formula, whatever the latter may be.

In forming such tables it must obviously be a matter of perfect indifference what body is chosen as the standard of specific gravity, whether oxygen, hydrogen, atmospheric air, or any other substance; the numbers representing the combining volumes will be altered by any alteration in the standard of specific gravity, but the *relation* between them will remain the same. The same remark applies to the equivalent weights; either of the scales in use may be taken, provided it be adhered to throughout.

Let us now turn to the consideration of combinations among solid substances, and try to see if any such simple and beautiful law is to be traced among these phenomena. The same mode of proceeding is here adopted; the combining volume is found by dividing the equivalent by the specific gravity, and represents in the same manner the number of unities of volume contained in one equivalent of the substance under consideration. In the following table of elementary substances, the scale of equivalents having oxygen equal to 100, in general use on the continent, has been adopted, while the specific gravities are, as usual, referred to water. In very many cases these latter are more or less uncertain, and fresh determinations require to be made. The results, therefore, must be considered as approximative only, and subject to future correction.

	Sp. gravity.	Equiv. weight.	Equiv. volume.
Antimony	6.72	1613	240
Arsenic	5.86	938	160
Bismuth	9.85	2660	270
Bromine	3.06	1000	326
Cadmium	8.60	697	81
Chlorine, liquefied	1.38	443	320
Chromium	5.10	329	64
Cobalt	8.39	369	44
Copper	9.00	396	44
Gold	19.10	2458	128
Iodine	4.93	1586	320
Iridium	21.60	1232	57
Iron	7.70	350	45
Lead	11.35	1294	114
Manganese	8.00	346	43
Mercury	13.60	1250	92
Molybdenum	8.68	596	68
Nickel	8.41	370	44
Osmium	21.80	1243	57
Palladium	11.70	666	57
Phosphorus	1.77	392	222
Platinum	21.60	1232	57
Potassium	.84	489	583
Rhodium	11.40	652	57
Selenium	4.30	495	115
Silver	10.40	1350	130
Sodium	.99	290	292
Sulphur	1.99	200	100
Tellurium	6.26	802	128
Tin	7.28	736	101
Titanium	5.33	302	56
Tungsten	17.10	1188	70
Zinc	6.95	406	58

From an inspection of this table, it is obvious at once that the simplicity presented by the phenomena of gaseous union, does not here exist. Still, however, relations may be observed which are too close and too numerous to be the result of accident. For example, several members of the same natural family or isomorphous group of elements have the same equivalent volume:—

I.		II.	
Cobalt	44	Iridium	57
Copper	44	Osmium	57
Iron	45	Palladium	57
Nickel	44	Platinum	57
Manganese	43	Rhodium	57
III.		IV.	
Molybdenum	68	Bromine	326
Tungsten	70	Chlorine	320
		Iodine	320

The equivalent volumes of selenium and sulphur, gold and silver, are also nearly the same; those of zinc and chromium, which belong to the first group, present serious discrepancies.

The equivalent volume of a compound of simple constitution, is sometimes made up of the equivalent volumes of its components; in other cases condensation appears to have taken place in the act of union:—

	Sp. gravity.	Equiv. weight.	Equiv. vol.	Sum of vols. of constituents.
Sulphuret of copper	4.16	596	144	144
Sulphuret of silver	6.80	1550	228	230
Bisulphuret of iron	5.08	750	147	245
Sulphuret of potassium	2.13	689	323	683
Sulphuret of sodium	2.47	490	198	393
Chloride of potassium	2.00	932	466	903
Chloride of sodium	2.24	733	327	612
Iodide of lead	6.38	2880	452	434
Iodide of silver	5.50	2936	534	450

In most of the few instances cited above, some approach to a regular law seems to exist, that is, if a very wide margin be left for practical errors of observation and sources of discrepancy to be presently noticed. The volumes of the sulphurets of copper and silver agree with the sum of those of their components; in bisulphuret of iron, the volume of the sulphur has suffered contraction to one-half; in the formation of the sulphurets of potassium and sodium, a condensation amounting to one-half of the whole has taken place; the same remark applies to the chlorides of these two metals; in the iodide of lead, no contraction has taken place; but in that of silver, the very anomalous effect of expansion.

One of the most curious and remarkable points which has yet come to light is the observation of M. Schroeder, that when from the calculated specific volumes of a series of analogous compounds, as oxides, chlorides, or other salts, the numbers representing the volumes of the respective metals or metallic oxides be deducted, the same number is often left as the representative of the volume of the common constituent of the series. The nitrates of baryta and strontia, the sulphates of zinc and copper, the carbonates of baryta and zinc may be thus compared:—

	Eq. vol.
Nitrate of baryta	501
Baryta	175
Nitric acid	326
Sulphate of oxide of zinc	294
Oxide of zinc	90
Sulphuric acid	204
Carbonate of baryta	294
Baryta	175
Carbonic acid	119

	Eq. vol.
Nitrate of Strontia	466
Strontia	140
Nitric acid	326
Sulphate of oxide of copper	280
Oxide of copper	76
Sulphuric acid	204
Carbonate of oxide of zinc	209
Oxide of zinc	90
Carbonic acid	119

This rule, however, does not seem to be general; or, at any rate, the same number does not always represent the combining volume of the same substance, neither do the different numbers obtained by this indirect method bear any simple relation to each other.

There are many considerations which tend to show that any law connecting the volumes of solids and liquids with their chemical equivalents, must in all probability be disguised and obscured by circumstances which are really or practically inoperative in the case of gases, in addition to which, the law itself may be of a more complex nature, and in this respect more in accordance with the varying properties and physical constitution of the bodies subject to its influence. The extreme uniformity and simplicity of the law of gaseous combination is intimately connected with the close uniformity of physical constitution enjoyed by all gases, independently of their chemical nature.

The effect of heat upon the different gases is sensibly the same; their rates of expansion, under ordinary circumstances, are so nearly identical, that for almost all practical purposes the differences may be neglected. The same ratio, therefore, between the specific gravities of these bodies will always be preserved, and observations made upon them be thus independent of the effect of temperature, provided that the particular temperature chosen be maintained throughout all the experiments. But with solids and liquids the case is widely different. Each of these bodies has its own particular rate of expansion by heat; the relative specific gravities of a number of such will vary exceedingly with the temperature at which the observation is made. In determining the specific gravities of numerous solids and liquids, therefore, with a view of forming a table of their comparative combining volumes, the question will at once arise, at what temperature this comparison is to be made. Will the same temperature serve for all, or must the specific gravity of each individual substance be taken at some particular normal temperature of its own? If the latter, how is this normal temperature to be found? Is it, as some have supposed, related to the melting or boiling-point of the substance? In what way, in short, is it hoped that bodies may be fairly compared under similar physical circumstances with respect to temperature?

Another very great difficulty springs from the modifications in the specific gravities of solids, arising from differences in the state of aggregation. Among the metals, for example, especially those which pre-

sent the character of malleability, the variations of specific gravity are extreme. Finely-divided metal reduced by hydrogen; the same metal melted into a button; and the button, after rolling or hammering, present differences as great as those between one metal and another. Carbon in the state of lamp-black, in that of graphite, in that of the hard deposit in coal-gas retorts, and in that of diamond, is not physically the same substance. The same remark applies to sulphur, which is capable of existing in two or three different states of aggregation, having two or three different specific gravities to correspond.

These remarks are by no means intended to deter those who may be willing to pursue this very important and interesting inquiry, but merely to point out some of the difficulties which beset the subject. That a real law of volumes does exist is in the highest degree probable, and that its discovery will in the end reward the diligence of those who seek it we do not doubt; but that the inquiry is yet in its infancy, and that the very foundations of this branch of research have yet to be laid by a solution of the preceding questions we also fully believe.

It is rather extraordinary that the papers of MM. Otto and Filhol contain no notice of the elaborate investigations of Messrs. Playfair and Joule, published in the *Memoirs of the Chemical Society of London.* The first of these especially,* contains an immense number of determinations of specific gravities of salts. The attention of the authors was chiefly directed to the subject of the volume occupied by salts in solution, but the valuable data preserved in this memoir are also applicable to other purposes.

FORMATION OF A NEW ACID FROM A FOSSIL RESIN, BY THE ACTION OF NITRIC ACID.

BY MR. WILLIAM BASTICK.

In making a deep excavation at Highgate, recently, a large quantity of a resinous body was found some depth below the surface, imbedded in a calcareous substance, a small portion of which came into my possession. In examining its properties, I found it to resemble a fossil body which Thomson has described, and which was obtained from the same locality. It is insoluble in water, slightly soluble in alcohol, and dissolves with greater facility in ether. Hard as colophony, highly inflammable; of the specific gravity of about 1.050. It suffers no important change by being boiled in a solution of caustic potash, consequently it contains no ready formed acid. Sulphuric acid dissolves it, the solution being of a purple brown colour. Water precipitates from the acid solution a carbonaceous substance, resembling artificial tannin. Nitric acid attacks this resinous body with great avidity, especially when heated, attended with the evolution of nitric oxide in great

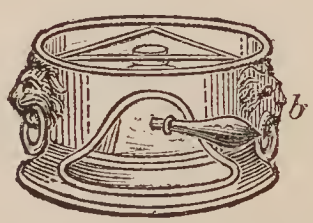
* Vol. ii., p. 401.

abundance, which shows that the oxidation of this substance takes place when so treated. Unlike most other resinous matters, when subjected to the action of nitric acid in a similar way, no oxalic acid is formed. If sufficient acid be employed, the whole of the fossil resin is oxidized and dissolved, but a portion of it will re-appear in the acid solution when cold, in the shape of small floating particles.

In searching for the chief product of oxidation, the cold solution was separated from the undissolved particles, and distilled water added to it in considerable quantity, which produced a voluminous precipitate of a pale yellow colour. This precipitate was well washed with distilled water on a filter, to free it from nitric acid and any other matters soluble in that menstruum. The precipitate when dried, was found to be in a state of impalpable powder, without any crystalline appearance. It is slightly soluble in cold water, and more so in hot. It has an acid re-action on litmus paper. To the taste it is very bitter and sour; it inflames when heated on platina, and leaves a carbonaceous residuum. It is soluble in ether and alcohol, which solutions when evaporated, leave a powder of the same appearance as the above dried precipitate. With solution of ammonia it is neutralised, and forms a reddish-brown solution, which when evaporated, produces an amorphous substance like ammonio-citrate of iron. Its behaviour with soda and potash is similar, producing soluble salts, but not crystallizable, at least so far as I have been able to observe. When the acid itself, or the neutral ammonia salt of it, is mixed with solutions of the salts of barytes, lime, and magnesia, it precipitates these bases in the form of almost insoluble compounds of them with this acid of a light yellow colour. In solutions of the salts of the protoxide of lead, iron, zinc, and bichloride of mercury, it gives precipitates of a more insoluble character, but similar in other respects. With a salt of copper, it throws down a light green precipitate, soluble in excess of ammonia. Added to a solution of nitrate of silver, it precipitates a compound soluble in excess of ammonia and nitric acid. These results were of a uniform character when produced by this acid prepared at different operations. Therefore, as I am unacquainted with any acid with similar properties, and as it does not appear to be a compound of two or more proximate principles, it may reasonably be assumed, that it is a new organic acid, produced by the oxidation of the fossil resin, especially as I have not detected the formation of any other body by the action of nitric acid. For want of a better name, I propose to call it *fosresinic acid*. I must leave to those who have more leisure and the inclination to do it, the task of ascertaining its constitution and atomic weight. I am informed plenty of the resin can be procured at Highgate or in its neighbourhood.

The acids which have the greatest resemblance in their properties to the fosresinic acid, are the pinic and colopholic acids. They form like it, salts soluble in water with the alkalies, and insoluble salts with the alkaline earths and metallic oxides. They are also uncrystallizable bodies. It may be distinguished from pinic acid by the greater insolubility of its salts in alcohol, and from colopholic acid by its colour, colopholic acid being dark brown. This last test is the only one, excepting the respective solubility of their salts, which Liebig gives for distinguishing pinic from colopholic acid, so meagre is the amount of information published, and perhaps ascertained, respecting the properties of these resinous acids. There is one circumstance worthy of remark in reference to these bodies, viz., that fosresinic acid is a product and the others are educts. Upon combustion I do not think this new acid will be found to be isomeric with any of the resinous acids, which relation they mostly bear to each other, but will probably be found to be richer in oxygen. Should, however, these speculations prove to be incorrect, it will at all events be an additional instance to our experience of the artificial formation of an organic acid.

CAREY'S PATENT HECLA.



This is a coffee-pot which may also be used for infusions in general. It consists of an external cylindrical vessel (*a*), within which a metallic funnel-shaped strainer is fixed, the upper rim of the funnel being soldered to the inner surface of the pot, near the top, while the tube of the funnel reaches nearly to the bottom of the pot. The strainer is fixed in the apex of the cone of the funnel; the spout communicates with the space beneath and beside the funnel.

In using the apparatus a cork is fitted into the end of the spout, and boiling water is poured into the funnel so as to fill it. While the cork remains inserted, the water, supported by the pressure of the air beneath, is retained in the funnel, which is the measure of the quantity to be used.

On removing the cork, the air in the lower part of the vessel being no longer confined, the water runs into the lower chamber. The coffee or other materials are now put into the funnel over the strainer; the cork is again inserted into the spout, and the pot is placed over the lamp *(b)*. When the water boils, the steam and expanded air force the water into the funnel in contact with the solid ingredients, and on removing the heat, as condensation and contraction take place, the fluid is forced back again by the pressure of the atmosphere.

The principle of action is similar to that of Parker's coffee-pot and several others which have been much used; but the one before us is the most simple in construction, and easily managed.

ON THE CULTIVATION OF COCHINEAL.

BY GERARDO JOSE DE NOBREGA,
Member of the Pharmaceutical Society of Great Britain.

I HAVE the honour of laying before the Pharmaceutical Society of Great Britain a translation (with some additions) of Santiago da Cruz e Gonçalves' *Treatise on the Cultivation of Cochineal*:—

The following practical hints for the cultivation of the nopal, and for rearing and preparing the cochineal insect for the purposes of commerce, are the result of the experience of Señhor Santiago da Cruz e Gonçalves, a Surgeon established in Teneriffe, who was appointed by the Spanish government to superintend the cultivation of this valuable article in that island, where it was introduced by a Spanish priest named Quinteiro, in the year 1826. The insects were procured by this person from Cadiz, and are the same that had been previously brought thither from Mexico*, after the Spanish government had lost all authority over the American Colonies, and had no longer any motive for opposing the introduction of the cochineal into the peninsula.

At the time of its introduction into Teneriffe, the government established a fund of 3000 dollars for the purpose of purchasing all the cochineal that should be produced, and thereby of encouraging its cultivation. The price was fixed at one dollar and a half per pound, and the article was exempted from tithes and export duties for the space of ten years. That this proceeding succeeded most satisfactorily, we have the best authority for believing.

The nopal is also a native of Madeira, where it grows most abundantly and luxuriantly. This fact induced my friend Miguel de Carvalho e Almeida to attempt the introduction of the cochineal insect into this beautiful island, and to a certain extent the attempt succeeded.

This gentleman found, however, that he had to contend not only with the natural indolence and prejudice of the country people, but also against obstacles raised by certain landed proprietors who were blind to their own interests. But the principal cause of the limited success which attended his endeavours, was, that no one on the spot offered to the cultivator a sufficiently remunerating price for his produce.

Beyond this, I know of no reason why cochineal might not become an important means in aiding to extricate the people of Madeira from the state of extreme poverty into which the gradual decline of the wine trade has plunged them.

In consequence of the slight encouragement which the cultivator received, the insects which he originally introduced, have been altogether neglected, and no care whatever bestowed on them. But, notwithstanding this, both they and the nopal plants have continued to thrive, and I am told on good authority that when sold and exported, the cochineal has been pronounced to be of excellent quality, and well worthy cultivation. When first introduced into Madeira, fears were entertained that the insect would attack and injure the fig and other fruits, but from enquiries I find that nothing of the kind has happened. I have seen the insects cultivated close to the vines, without any appearance of their spreading to, or injuring the latter in any way.

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* There is no doubt but that this insect is identical with that known in Mexico by the name of *Grana fina*, and which is distinguished by being covered with a white powder, which, however, does not conceal the wrinkles on the body.

DIRECTIONS FOR THE CULTIVATION OF THE NOPAL, AND THE REARING OF THE AMERICAN COCHINEAL INSECT.

1. *Of the Cultivation of the Nopal.*—In countries that possess but little soil fitted to produce the necessaries of life, and that abound in arid and rocky land, it is of great importance to be able to substitute the production of some other article that may commercially compensate to the population for the barrenness of the soil. For such land in a tropical climate, there is nothing more easily or more profitably cultivated, than the cochineal raised upon the nopal plant, commonly called in Portuguese *Figueira da India* or *Tababeira*, the *Cactus cochinillifer* of Linnæus, the *Opuntia cochinillifera* of Candolle.

Besides yielding cochineal, the nopal makes an excellent fence for fields, and thus a double advantage accrues from its cultivation. In grounds already fenced, the plants should be placed three feet apart, so that there may be plenty of room for cultivating them and gathering the cochineal.

It has been said that the nopal with red fruit is the best food for cochineal insects ; but this is a mistake, for the insect does not derive its colour from the plant, but generates it. It is its own proper and natural colour. Experience has shown that the best plants are those which are most succulent, least prickly, and have the most delicate cuticle.

The nopals may be used for four or at most five years, for rearing cochineal. At the end of that they should be pruned, and the cuttings planted in another plot of ground to be ready against the next year ; for after five years the plants become very hard, and the insects find great difficulty in adhering to them, in consequence of the dryness and roughness of the cuticle. The land therefore, should be divided into two portions. Experience leads me to believe that when the nopal is properly pruned, it sends out vigorous shoots, hence there is no necessity for uprooting the old plants to form a totally new plantation, but they should be lopped so as to leave on each stem the second buds and shoots only.

As every cultivator has at first only a small number of insects, it is advantageous to plant strong shoots of the year in pots and boxes, so that the insects may thus be exposed to the sun in the most favourable manner possible, as soon as they are fixed. To make a large plantation, the shoots should be prepared beforehand, by separating them from the trunk at the articulations, and by exposing them to the sun and air for eight or nine days, in order to harden the scars, otherwise they are apt to rot as soon as planted. The ground ought to be laid out in trenches, and the shoots placed six or eight feet apart, in rows with their flat sides facing the walks. The rows should be at intervals of six or eight feet, or, where economy of space is not an object, ten feet may be left between them, the better to allow free exposure to the sun and air. The plantation should be kept free from weeds, those growing nearest to the plants being removed by hand, in order not to disturb the roots with the hoe.

Watering is not required after the plants have struck, but if the weather be excessively hot, and the young shoots much loaded with insects, deficient in plumpness, and becoming wrinkled and dry, they should then, if possible, be watered every six days, either before sunrise or after sunset. In this case the plants themselves should not be watered, but only the intervals between the rows, so as not to hazard the rotting of the plants from too much moisture.

When cochineal is reared in pots, the juices of the plant are most rapidly exhausted, for the roots being numerous and unable to extend themselves, soon fill up the whole of the soil, and it is necessary to water them lightly but frequently, for the benefit of the plant, and consequently of the insect. Such plants should be renewed every second year, as they are apt to become hard, and the second shoots are too feeble to afford sufficient nourish-

ment to the insects. In stony places that are not too steep, shoots should be planted inclined instead of upright, that they may the better strike root, but in such a manner that the young sprouts come not too near to the ground. The plants should be encouraged to shoot upwards, so as to afford no additional means of ascent to the few larvæ that infest the cochineal. When the plants show flower buds, these are to be cut off, because the fruit which succeeds to the flower exhausts the plant, and thereby deprives the insects of part of the juices on which they feed. These are small, round, and easily distinguished from the young leaves, which are somewhat flatter.

2. *Of the Rearing and Breeding of the Cochineal Insect.*—When the insects have attained the average size of the tick that infests dogs, they are mature. At this period, which occurs when they are from a hundred to a hundred and fifteen days old, and when they are about to breed, there appears on them a sort of down or cottony deposit, secreted by the upper or lower part of their bodies. Hitherto they have appeared white, now they become darker and reddish, and some opaque, while others undergo no change of colour, but merely become enlarged at their posterior extremity, and present a sort of strong down arranged in stripes. When they have arrived at this stage, it is time that they should be removed from the plants, and deposited in nests. It must not be forgotten that the state of the atmosphere, with regard to heat and moisture, has the greatest influence upon the health and development of the insects. When the air is moist, their development is much retarded, and they come out debilitated; but when on the contrary, it is warm and dry, their hatching is promoted, and they become robust.

The cultivator should always be ready to seize the favourable opportunity for removal, but should not detach any parent from the plant until the young are seen to emerge from under the mother, that he may not run the risk of losing the brood. As some of the insects breed sooner than others, the earliest are to be taken off first, without disturbing the rest; the former are larger, and their down or hair darker, while their posterior part is thicker, more depressed, and, as it were, attached to the plant. The colour of the insects themselves is observed to be darker when they are covered with these long white filaments, and in this state their colour undergoes no alteration. At first it may be somewhat difficult to take advantage of the exact moment when the females are fit to be removed, but after a while with a little care, this will be very easily effected.

As soon as the white insects, which appear like small points, are seen moving upon the plants, those females which present the characteristics already mentioned, are to be taken off without injury by means of the end of a quill, and are to be collected in small paper cones. The insects being collected, pieces of very open canvas, about two inches square, are to be provided capable of holding them, and yet of allowing free passage to the young through their meshes. These pieces of canvas are then to be held by their four corners, and six or more insects, according to the strength of the nopal joint for which they are intended, are to be placed upon them, and then with nopal spines they are to be pinned by the corners upon the under surface of the plant, so that the young may freely creep out and spread themselves over the surface. These breeding receptacles or nests may also be made of the inner sheath or spathe of the maize or Indian corn, formed into a sort of cartridge, and pinned on with nopal spines as above, perforating the membrane with holes at the ends and sides, so that the young may find their way out; but whatever be the material employed, it, as well as the spines, should be previously prepared and ready for use.

Whilst this simple operation of nestling is going on, if the insects are in

true breeding order, the young may be seen even a few minutes after they have been deposited, moving about upon the plant in search of a spot where they may attach themselves. Before the insects are fixed, the shoots of the plant should be well cleared of dust and cobwebs with a sheep's tail or something similar, so that the young insects may meet with no impediment to their progress. Very often too many insects collect within one space, and exhaust the juices of the shoot to such an extent as frequently to destroy it, particularly when the shoot is tender. The same thing happens when the females are allowed to live and breed on the same spot, so that when the young ones arrive at the end of the first or second period of their existence, they are insufficiently nourished, in consequence of their number being greater than the shoot can support. The result then is, that the shoot dies, and as it perishes, the insects loosen their hold, and at length fall off, and die also.

Wherever any spot is thus overcrowded with young insects, the breeding case should be carefully removed, and fastened to the opposite side of the shoot. The transplanting only requires a few days. I have known cases in which twenty or thirty days have elapsed after the fastening on of the nests before they were taken off and attached to other shoots, and yet these also received young, which arrived at maturity. At the end of thirty days, however, the females may be removed from the shoots, dried in the sun or in an oven, and are then ready for use. Although the operation of transplanting the females may be carried on at any time of the day, the morning, if not too early, is best, for then the young move about with most activity. It should never be practised in damp or in windy weather, for in the latter the insects may be blown away and lost, and in the former they are debilitated. In the Mexican provinces there are two qualities of cochineal, one which is reared on the cultivated nopal (*Grana fina*) and another which is found on the wild cactus (*Grana sylvestra*)*. The fine cochineal is subdivided into two varieties, namely that which has already propagated, and is known as *Zacatillo*, and that which is killed before breeding. The latter is the heavier, and therefore the cultivator prefers selling it, a portion only being reserved for propagation. For dyeing, these two varieties are equally good. In order to extend widely this very important source of wealth, it is well to go on (keeping the greatest possible number of females) propagating the insects from one set of nopals to another without killing any, till an ample supply be obtained for stocking the intended plantation.

From the second to the fifth year, when the plants are to be pruned, care must be taken that no nests are attached to the inferior joints, or to the stem, for as these are hard, it is difficult for the young to attach themselves to them. It is highly important that the young shoots should not be inclined towards the ground, otherwise access would be afforded to the insects which injure the cochineal, and the cochineal be rendered impure by the soil raised by the winds, or by rain.

When the young come forth and spread themselves upon the plant, they attach themselves to it by their feet, and thrust their sharp mandibles into the tissues, and thus they remain till they die. Once detached, they never take hold again, and consequently perish. The insect is capable of propagating when it has attained the age of 100 or 115 days, but sometimes rather later. I have however often seen insects that were hatched in the height of the hot season, begin to propagate before the end of three months. Along the whole of the coast of the Canaries, three crops of cochineal may easily be reared, and perhaps four, if a separate plantation be kept for breeding only. In the coldest parts, two crops may be had

* The former seems to owe its superior plumpness and size to the attention bestowed upon it. The latter is called *Granilla* (small grain).—*Trans.*

Opuntia Decumana, or Madeira Nopal, with Cochineal Insects.

from April to September both inclusive, and this will be over and above the other produce that the land may yield besides. On the south coast, where winter is only a continuous spring, three crops may easily be obtained. Attention must be given however in winter, to preserve insects of good quality, rather than to gathering crops.

The common caterpillar of our island (*lagarta*) is the only insect that I know of which destroys the cochineal. When a deficiency of insects on the plants is noticed, their down must be examined, and if this be found disturbed or scratched, we may suspect the caterpillars have been at work, but the red colour of the excrement they leave behind, is clear proof of their having been there.

From thirty to thirty-five days after the birth of the insects, sundry small cylinders or cocoons, composed of a sort of white cotton, may be observed, which contain the males. These resemble small gnats, and are of a reddish-white colour, make their appearance, impregnate the females, then flutter about, and die. In order to preserve the cocoons till the males have performed their functions, the dust should not be swept off the plants until after the expiration of the sixty days, but if there be an excessive quantity of dust, it may be blown off by the breath. Cobwebs should be carefully removed from the plants, as they may be detrimental to fecundation, by entangling the male insect. When the insect is destined to be killed, it should be kept free from everything that may interfere with its development; care must always be taken not to detach it. Nopals that are planted by the side of fences, should be so arranged that free access may be had to the insects behind as well as those in front.

Before proceeding to explain the methods of killing the insects, it will be well to warn the cultivator that he should never have insects of different ages on the same plant, otherwise considerable confusion may arise.

METHODS OF KILLING THE COCHINEAL AND PREPARING IT FOR SALE†.

As the value of cochineal greatly depends upon the way in which the insect is killed, I shall now detail the methods most commonly employed in the Mexican provinces:

The insects when about ninety days old, are gently removed from the plants by means of the feather of a quill‡, or something similar, so as not to injure them; they are then received in paper cones, and afterwards spread upon boards or mats, and killed in any of the following ways:—

1st. Spread upon sheets or mats they are to be exposed daily to the full heat of the sun, being turned over from time to time, and taken in at night, until they are perfectly dried.

2d. Spread upon broad trays of palm or other wood, they are to be put into an oven, at the heat used for bread baking, the oven is to be kept open, that they may from time to time be turned over so as to be uniformly heated, and after two or three hours they may be finally dried completely, if necessary, by exposure to solar heat.

3d. Boiling water may be poured over them in the trays, stirring them up, and when dead, they should be well shaken, and exposed to the sun till thoroughly dried.

I have tried, though on a small scale, all these three methods, and with the best results. I had not so much confidence in the last as in the other two methods, but considerably inclining the trays so as to allow the water

† Dr. Bancroft says the best cochineal "is large, plump, dry, and of a silvery white colour on the surface," but there is no reason for believing that the colour depends on any thing else than the method used in killing the insect.—*Trans.*

‡ In Mexico a blunt knife is used for the purpose.

to run rapidly off, the cochineal is undoubtedly left very brilliant and silvery. Water never takes up the *slightest* trace of colour, unless some of the insects have been broken. Each plan may have its own inconveniences, and may therefore require modification, which experience will point out, and each proprietor will of course adopt that plan which he deems most advantageous. After the cochineal has been thoroughly dried, it is to be cleaned and prepared for sale.

With this view it is to be freed from cocoons and dirt, and put into bags of canvas or palm matting, called by the Indians *Java*, and in them shaken, so as to detach the white dust adhering to it, it is then to be sifted through three sieves, having apertures of a certain diameter, the first of which allows the dust, &c, to pass, but not the insects, the second separates the small insects from the large ones, and the third retains the largest specimens of all. This done, the three kinds are to be packed separately in bags, and are then ready for sale.

I have received the following communication from Dr. Pereira respecting the Madeira nopal.

"*Finsbury Square, Nov.* 4, 1848.

"My dear Sir,—Some months since, when you kindly gave me some living cochineal insects on the Madeira nopal, I told you that I did not consider the plant to be the true *Opuntia cochinillifera* of botanical writers, but a neighbouring species. I have been subsequently confirmed in this opinion by a letter which I have received from Mr. Smith, the principal gardener at the Botanic Garden, Kew, in which he tells me that at the Kew Garden, the Madeira plant is called *Opuntia decumana*. Of course, this or any other species, on which the cochineal insect feeds and lives, may be said to be *cochinilliferous*; but the opuntia to which botanists have applied the specific name of *cochinillifera* is a species distinct from, though closely allied to, *O. decumana*. The sorts of opuntia best adapted for cultivation of cochineal are obviously those which have but few spines, as it must be very troublesome to collect the insects from very prickly species.

"I do not know whether you are aware that my friend, Mr. Augustus Faber, brought some living cochineal insects from Madeira, and that the eminent entomologist, Mr. Westwood, has published some observations respecting them. In the *Proceedings of the Entomological Society of London* for March 1st, 1847, Mr. Westwood states that he had ascertained that the habits of the cochineal 'were unlike those of the ordinary *coccidæ*, as the females brought forth their young alive, and which were not deposited beneath the body: moreover, the male *pupæ* were enclosed in a bag-like cocoon, with the lower end open, out of which the imago escapes backwards with the wings laid over the head; thus, as well as in other respects, warranting its generic separation as proposed by him in his *Introduction to the Modern Classification of Insects*.' In reply to a question by Mr. Newport, Mr. Westwoood observed further 'that the circumstances which he had detailed took place in the ordinary temperature of the atmosphere during the preceding summer and autumn, the plants having been kept in a chamber without a fire.'

"On referring to Mr. Westwood's *Introduction to the Modern Classification of Insects*, vol. ii., p. 448, Lond. 1840, I find the author states, that the cochineal 'belongs to a genus distinct from the preceding species [*coccus*], and which I propose to name *Pseudo-coccus*, the male more nearly resembling the true cocci, whilst the female is more like the Porphyrophora, being slightly active, with short antennæ and feet, and enveloped in a dense white cottony secretion.'

"Believe me faithfully yours,

"Jonathan Pereira."

"G. J. de Nobrega, Esq."

EFFECTS OF THE USE OF ARSENIC IN AGRICULTURE.

POISONED GAME.

Dr. Fuller, of St. George's Hospital, has recently called attention to the probable injurious effects resulting from the use of arsenic in steeping seed corn.

"For some months past (says Dr. Fuller) in certain parts of Hampshire, partridges have been found dead in the fields, presenting a very remarkable appearance. Instead of lying prostrate on their side, as is usually the case with dead birds, they have been found sitting with their heads erect and their eyes open, presenting all the semblance of life. This peculiarity, which for some time had attracted considerable attention among sportsmen in the neighbourhood, led to no practical result until about ten days ago, when a covey of ten birds having been found nestled together in this condition, two of the birds, together with the seeds taken from the crops of the remaining eight, were sent up to London for examination. I was requested to undertake the investigation, and the result of my experiments I will now briefly detail.

"I first examined the seeds taken from the crops of the birds, and detected, as I anticipated, a large quantity of arsenic.

"I now, at the suggestion of my friend, Mr. Stone, proceeded to ascertain whether the flesh of birds so poisoned might not itself prove poisonous when eaten, and with this view I carefully cut the flesh off the breast and legs of one of the birds, and gave it, together with the liver, to a fine, healthy cat. She ate it with avidity, but in about half an hour she began to vomit, and vomited almost incessantly for nearly twelve hours, during the whole of which time she evidently suffered excessive pain. After this, nothing would induce her to eat any more partridge. I kept her without food for twenty-four hours, but in vain ; she resolutely refused to touch an atom more of the bird. This being the case, I gave her some beef and some milk, which she eagerly swallowed, proving beyond doubt that her instinct, and not her want of appetite, induced her to forego the dainty meal which had just been offered her.

"I now felt satisfied, from my observation of the symptoms induced in the cat, borne out as they were by many facts we are acquainted with respecting the action of poisons, that the arsenic which the partridges had swallowed had been absorbed in sufficient quantity into the system to render the flesh of the birds poisonous, and to induce poisonous effects in any one partaking of it. However, I was anxious to leave nothing to hypothesis, and as the cat had so soon rejected by vomiting the greater part of the bird she had eaten, and pertinaciously refused to repeat the experiment by again partaking of the poisoned food, I was obliged to have recourse to chemical analysis, with the view of ascertaining with certainty the existence or non-existence of arsenic in the flesh itself. I therefore cut the flesh off one side of the breast of the other partridge, and after about an hour's boiling, I obtained by Reinsch's process, a thin incrustation of metallic arsenic, thus demonstrating beyond question what the previous experiments had left little room for doubting."

Dr. Fuller ascribes the poisoning of the game to their having eaten the seed-corn which had been steeped in a solution of arsenic ; and he very justly observes—

"It is notorious that many of the dealers in game are supplied, through the agency of poachers and others who have a direct pecuniary interest in supplying them with the largest possible number of birds. It is certain, moreover, that if men of this sort were to find a covey of partridges in a field, dead, but fresh and in good condition, they would not hesitate to send them with the remainder of their booty to the poulterer, who would as cer-

tainly, without suspicion, sell them to his customers. And after the experiments above detailed, there can be no reasonable grounds for doubting that these birds, when eaten, would produce disagreeable and injurious—not to say poisonous—effects on those who partake of them. It is obvious, therefore, that in all cases of supposed cholera, or of suspicious bellyach, occurring at this season of the year, we shall do well to make particular inquiry as to whether our patient has recently partaken of pheasants or partridges purchased at a poulterer's ; and it is further manifest, that in all cases of poisoning or suspected poisoning by arsenic, the fact of the persons having lately eaten of partridges and pheasants must form an important element in the inquiry, and must tend to cast a suspicion on the evidence adduced to prove a criminal intent on the administration of the poison. So that, in a medico-legal point of view, the question is one of the gravest import."—*Lancet.*

[The subject to which Dr. Fuller has very properly called attention has been pretty fully discussed by Mr. Taylor, in his recently published work on Poisons. Mr. Taylor had found arsenic in the flesh of game which had been poisoned by steeped corn, and arrived at the same conclusions as Dr. Fuller. The subject has also been investigated in France, where a commission was appointed by the Academy of Sciences to prosecute an inquiry as to whether the flesh of sheep suffering from the effects of arsenic was poisonous. It was ascertained that the flesh of poisoned animals is noxious ; but if they live sufficiently long, the whole of the arsenic is voided in the urine and fæces, and the flesh may then be eaten with impunity.—Ed. Ph. Journ.]

THE DEATH OF SEVENTY EMIGRANTS BY SUFFOCATION.

We extract from the *Medical Gazette* of December 15th, the following notice of this disgraceful event :—

"Few occurrences are calculated to display a greater degree of criminal ignorance, or a greater recklessness of human life, than that which has been recently recorded in the daily journals, of the loss of seventy lives on board of an Irish steamer. The vessel, it is stated, left Sligo on the afternoon of Friday, December 1st, and there were on board 150 emigrants, who were to be conveyed to Liverpool on their way to America. It appears that during the night there came on a heavy gale of wind ; and, as it is alleged, in order to allow of the free working of the vessel, these unfortunate persons were crowded into the steerage cabin, the only aperture by which air could be supplied was closed, and a tarpaulin nailed over it, so as to prevent the possibility of any renewal of air. The cabin into which the emigrants were thus forcibly thrust, is stated to have been eighteen feet in length, twelve in width, and about seven feet in height, giving a total capacity of about 1512 cubic feet ; a large portion of the air being, of course, displaced by the introduction of their bodies. As an adult of middle age consumes, or renders unfit for respiration, about a cubic foot of air per minute, it is easy to form an idea how long 50, 100, or 150 persons, would be likely to live in such an atmosphere. Under these circumstances it is not surprising, that seventy should have been found dead ; the wonder is rather that a single person was found living. It is highly probable, that had the steerage cabin been kept closed only a few minutes longer, all would have perished by the most horrible death to which a human being can be exposed, namely, suffocation from confined air. It seems that on

entering the cabin, a lighted candle was in two successive attempts extinguished by the mere foulness of the air.

"We do not mean to contend that the captain of a steamer is expected to know exactly the quantity of air required for the support of human life; but the law will not excuse an individual, who, for his own convenience, nails another closely in a small box: if possessed of common sense, he must be aware that suffocation would be the infallible result of his act. The captain of the steamer appears to us to have placed himself in this position: he closely confined a large number of persons in a space in which there could be no renewal of air, and in which the quantity was insufficient for even one-tenth of those who were condemned to breathe it. This may have been ignorance, but it was unquestionably ignorance of the most culpable kind, and indicative of an utter recklessness of human life."

REVIEWS.

PRACTICAL TREATISE ON CHEMICAL ANALYSIS, *including Tables for Calculations in Analysis.* By H. ROSE. *Translated from the French and from the Fourth German Edition, with Notes and Additions.* By A. NORMANDY, Vol. I.—QUALITATIVE ANALYSIS, pp. 746; Vol. II.—QUANTITATIVE ANALYSIS, pp. 857; 8vo. London: Printed for William Tegg, 1848-9.

As Heinrich Rose, of Berlin, is universally considered the most accomplished master of the analytical school of Germany, and, since the death of Berzelius, we may say of Europe, so his *Handbuch*, or Manual, is the most complete, most scientific, most exact, most practicable, and easiest guide to Chemists, young and old, in the conduct of Chemical Analysis. The first edition appeared at Berlin, in 1829, and an English translation was published in 1831, by Mr. John Griffin, to whom our Chemists have been since indebted for several useful compends in analysis and mineralogy. Dr. Normandy, observes that his translation contains one-half more letter-press than that of Mr. Griffin, additions made chiefly by Rose himself to his subsequent German editions, though the Doctor also has introduced much useful matter from Peligot, the commentator upon Jourdan's recent French translation, from Fresenius, and other writers on analysis, as also from his own experience in practical Chemistry, in which he seems to be no tyro. Asterisks placed at the beginning of many paragraphs denote Rose's additions, not existing in the former English translation; the words "E. Peligot" indicate that gentleman's contributions, and the other new matter is printed in foot-notes or references. In 1833 Rose's second edition appeared in Berlin, in two or three years the third edition, and in 1838 the fourth; since which period Rose has never ceased to invent and describe new processes and artifices of the analysis of inorganic and organic bodies, which he has generally made known, through the medium of Poggendorff's *Annalen*, from which they have been distributed among the best scientific journals. Dr. Normandy seems to have so diligently incorporated all these improvements into his comprehensive work, that we can conscientiously recommend it as a manual in the chemical laboratory.

Besides the translation of Rose, which he has laboriously and faithfully executed, Dr. Normandy has also favoured the chemical world with a distinct volume of upwards of 300 octavo pages, entitled *Prac-*

tical Introduction to H. Rose's Treatise on Chemical Analysis, illustrated by synoptic Tables and numerous Formulas. He has here explained, briefly and clearly, the rationale of the processes upon which the analysis of compounds is based, and given a classified epitome of the re-actions of bodies upon one another—an epitome acceptable to readers but moderately advanced in chemical knowledge. This smaller book is offered as a guide and an introduction to Rose's large work. The nature, and in some measure the value of this synopsis, may be inferred from the following outline of its contents:—

"CHAP. I.—Preliminary observations on acids, bases, salts, alloys, analysis; tables of simple bodies, with their symbols and equivalents; rules for chemical notation.
"CHAP. II.—Metals and metallic oxides.
"CHAP. III.—Salts; their characters and generalities.
"CHAP. IV.—Distinctive characters of salts as to their base.
"CHAP. V.—On the different re-actions by means of which the nature of compounds may be determined.
"CHAP. VI.—Qualitative analysis.
"CHAP. VII.—Qualitative analysis of compounds which are soluble in water, and which consist only of a metallic oxide or base combined with an acid, a metal, or a non-metallic body. This is a most ingenious and useful chapter.
"CHAP. VIII.—Qualitative analysis of compounds which are insoluble, or sparingly soluble in hydrochloric or nitric acids, and which consist only of a metallic oxide or base and an acid, or of a metal and a non-metallic body.
"CHAP. IX.—Qualitative analysis of compounds insoluble or sparingly soluble in water and in acids, and which consist of only one acid and one base.
"CHAP. X.—Analysis of mixed compounds, which are soluble in water.
"CHAP. XI.—Analysis of mixed compounds soluble in hydrochloric or nitric acid, but hardly in water.
"CHAP. XII.—Examination of compounds insoluble by these means.
"CHAP. XIII.—Summary processes for detecting the genus of salts."

AN INTRODUCTION TO PRACTICAL CHEMISTRY, including ANALYSIS. By JOHN E. BOWMAN, Demonstrator of Chemistry in King's College, London. John Churchill. Pp. 280.

THERE is a growing conviction among the increasing body of chemical students, that the only effectual method of learning Chemistry is to enter upon a course of practical operations in the laboratory. Lectures are valuable as means for bringing recognized principles, and the facts from which they are deduced, systematically under notice, so that the student may get a comprehensive view of the subject in all its leading features; but a correct knowledge of minute details, which is essential to the Chemist, can only be acquired by repeated experiments, in which the learner is himself the operator. Several new laboratories for practical instruction in Chemistry have sprung up within the last few years, and the number of pupils engaged in this branch of study is greater than it has been at any previous period in this country. Mr. Bowman's little book is intended for the use of this class of students, its special object being "to render simple to the beginner the various processes employed in analysis, or which have been devised for the illustration of the principles of the science."

A work of this kind was certainly required, and we think Mr. Bowman has well supplied the deficiency. There is evidence of the exercise of much care and sound judgment in the selection, arrangement, and preparation of the matter. An introductory chapter is devoted to the explanation of the use of chemical symbols and equations, together with some general rules for the guidance of the pupil in his experimental operations. The author, in this part, has very judiciously adopted the hydrogen scale of equivalents and whole numbers, as being the most simple and easily recollected. This is followed by a well-devised course of operations in pneumatic chemistry, distillation, glass-working, the use of the blow-pipe, the determination of specific gravities, alkalimetry, &c., in which all necessary details, accompanied by wood-cuts, are given, for enabling the pupil to become familiar with chemical operations. The decompositions which occur in the chemical processes comprised in this part of the course are explained, and the attention of the pupil is specially directed to the examination of the characters and properties of the several products, and the phenomena which accompany their formation. We consider this the best possible kind of introduction to the analytical operations which are next described. The practice, sometimes adopted, of setting a pupil to work at chemical analysis before he has learnt the principles of chemistry, become acquainted with the ordinary phenomena accompanying chemical combinations and decompositions, or acquired experience in manipulations, is surely beginning at the wrong end.

In the part of Mr. Bowman's book which relates to analysis, the subjects are treated with much perspicuity, and divested of all redundant matter, the ostensible object of the work being consistently maintained throughout, of supplying to the beginner an easy and familiar introduction to the study of practical chemistry, which shall prepare him for entering upon a more extended course.

Chemical Manipulation and Analysis, *Qualitative and Quantitative. By* Henry M. Noad, Lecturer on Chemistry at St. George's Hospital London : Robt. Baldwin, pp. 311.

We have already noticed the first part of this work, which treats of *Qualitative Analysis* (*see* vol. vii., page 551). The second and concluding part, on *Quantitative Analysis*, is now before us. There could scarcely be a more striking indication of the rapid progress which has been made in the cultivation of experimental Chemistry in this country, within the last eight or ten years, than the numerous accessions of works treating on this branch of the science affords. In addition to the more voluminous works of Rose and Fresenius, of which excellent translations have been published, we have the less bulky work of Parnell, the still slighter volume of Will, and the introductory treatise of Fownes. Yet, further additions are now made in the subjects of the preceding and present notice. Mr. Noad's book is intended to form part of a series of treatises on Chemistry in the *Library of Useful Knowledge*, and it is therefore designed for the general reader and amateur Chemist. In extent it occupies a place midway between the complete work of the celebrated Rose, and the introductory treatises to which we have alluded. It appears to be a careful digest of the most approved processes for the analysis of inorganic and

organic substances, and to those who desire a compendious treatise on the subject it will be found a cheap and useful work.

The style of Mr. Noad is already known to many of our readers, through his previously published works on Chemistry and Electricity. We do not find in the present volume that he has sacrificed his usual perspicuity to the endeavour to render the matter as concise as possible. Mr. Noad appears to have exercised an independent judgmeut in selecting his matter from various sources, and also in its arrangement, which is well adapted to the scope and purpose of the work. He has avoided the use of new terms in chemical nomenclature, which is especially commendable in a book intended to form part of a series of popular works. In reference to essential facts, however, as for instance, in the adoption of equivalent numbers, the newest determinations have been followed, and here it may be remarked, that the simple equivalents in whole numbers, the use of which we have commended in Mr. Bowman's introduction, could not with propriety have been used in the calculations involved in quantitative analysis, which Mr. Noad's book contains.

L'OFFICINE ; ou Répertoire Générale de PHARMACIE PRATIQUE. Par DORVAULT, Ex-Pharmacien des Hopitaux, &c. Deuxième Edition.

THIS work, which has had a very extensive circulation in France, occupies a position in reference to French Pharmacy similar to that which *Gray's Supplement* holds in relation to the Pharmacy of this country. There is this difference, however, between them, that the formulæ in *L'Officine* are almost exclusively extra-official, while in the *Supplement* the whole of the formulæ of the British Pharmacopœias are included. The work is arranged alphabetically throughout, including drugs of animal, vegetable, and mineral origin, and the formulæ for their preparations. There is also much useful information with reference to practical manipulation. It will be found a valuable work for those who are occasionally applied to for foreign medicines, and may be referred to with confidence, as it bears a high reputation abroad. The present edition has been enriched with a large amount of new matter.

PRACTICAL PHARMACY : *the Arrangements, Apparatus, and Manipulations of the Pharmaceutical Shop and Laboratory.* By FRANCIS MOHR, Ph. D., Assessor Pharmaciæ of the Royal Prussian College of Pharmacy, Coblentz ; and THEOPHILUS REDWOOD, Professor of Chemistry and Pharmacy to the Pharmaceutical Society of Great Britain. Illustrated by Four Hundred Engravings on Wood. London : TAYLOR, WALTON, and MABERLEY, Upper Gower Street, and Ivy Lane, Paternoster Row. 8vo, pp. 390.

The notice of this work is deferred until next month.

THE SERPENTINE AS IT IS, AND AS IT OUGHT TO BE, AND THE BOARD OF HEALTH AS IT IS, AND AS IT OUGHT TO BE. By EDWARD JOHN TILT, M. D., &c. &c. 8vo, pp. 67. JOHN CHURCHILL, Princes Street, and G. A. CALDER, Bathurst Street.

TO CORRESPONDENTS.

A Constant Reader.—Instructions for preparing Collodion are given in our number for October, p. 169.

℞. Honey Water, see vol. iv., p. 244. Aromatic Vinegar.—℞ Oil of Cloves, ʒj; Oils of Lavender and Citron, āā ℥ij; Oils of Bergamot and Thyme, ℥j; Oil of Cinnamon, gtt. x; Strongest Acetic Acid, ℨj.—Mix.

L.C.—In the preparation of Liquor Taraxaci, a deposit takes place when the spirit is added. The quantity of deposit varies according to the state of the juice. It should be filtered in the course of a day or two.

An Associate (Liverpool).—A Druggist would not be liable to a penalty for selling the articles mentioned, unless he knew or suspected that they were wanted for an illegal purpose.

J. P. S. (Holt.)—A new Pharmacopœia is in course of preparation for the press. It is uncertain when it will be published.

W. W. N. (Tunbridge Wells.)—It is not usual to state the price of works in reviewing them.

J.—(1.) Try pearlash.—(2.) Probably the water is conveyed through an iron pipe.

Inquisitor (Bridport).—Registered apprentices who evade the subscription in the manner alluded to, pay an extra fee on becoming Associates.

J. B. (London) has sent us a specimen of the "cutting system" between a general Practitioner and a Chemist in the Walworth Road. The former, determined not to be outdone, inserts in his shop-bill (which is headed First Edition) a double column, showing a comparison of his charges with those of his opponent; for instance, he charges opodeldoc 2*d.* an ounce, the other 3*d.*, &c. He concludes by saying that his second edition of prices will be still lower—advice gratis—vaccination gratis—poor women attended in their confinements for half a guinea.—[This kind of competition between "medical men" and Chemists is ruinous to both.]

A Constant Reader and *a Registered Apprentice.*—Ether, chloroform, or benzole, may be used as a solvent for caoutchouc. Benzole is obtained by distilling coal-tar naphtha at a low temperature, and collecting only the product that first distils over.

A Subscriber.—The following method of ascertaining the per centage of copper in the ore by assay, is extracted from Dr. Ure's *Dictionary of Arts and Manufactures:* "The first thing is to make such a sample as will represent the whole mass to be valued; with which view fragments must be taken from different spots, mixed, weighed, and ground together. A portion of this mixture being tried by the blow-pipe will show by the garlic or sulphurous smell of its fumes, whether arsenic, sulphur, or both, be the mineralizer. In the latter case, which often occurs, 100 grains, or 1000 grains, of the ore are to be mixed with one-half its weight of saw-dust, then imbued with oil, and heated moderately in a crucible, till all the arsenical fumes be dissipated. The residuum being cooled and triturated, is to be exposed in a shallow earthen cup to a slow roasting heat, till the sulphur and charcoal be burned away.—What remains being ground and mixed with half its weight of calcined borax, one-twelfth its weight of lamp-black, next made into a dough with a few drops of oil, is to be pressed down into a crucible, which is to be covered with a luted lid, and to be subjected in a powerful air-furnace, first to dull red heat, and then to vivid ignition for twenty minutes. On cooling and breaking the crucible, a button of metallic copper will be obtained. Its colour and malleability indicate pretty well the quality, as does the weight, the relative value, of the ore. It should be cupelled with lead to ascertain if it contains silver or gold. If the blow-pipe trial showed no arsenic, the first calcination may be omitted; and if neither sulphur nor arsenic, a portion of the ground ore should be dried, and treated directly with borax, lamp-black, and oil."

F. G. M.—Hydrosulphuric acid is most readily obtained by adding diluted sulphuric acid to sulphuret of iron.

M. N.—We are not aware that gold has ever been found in minerals in any other than the metallic state.

E. M.—(1.) Socotrine aloes should be used in making *compound decoction of aloes*. The decoction should be strained so as to render it clear.—(2.) *Fownes's Manual of Chemistry*.

Mr. Couchman is anxious to obtain through the pages of this journal a formula "for a good *jet black ink* that will keep, and retain its colour without turning grey, and that cannot be obliterated by steam, gas, or any chemical process; also for a "good *red ink* that can be used with a steel or any other pen, without changing its colour."

Ignoramus inquires the meaning of the term "Sodæ ½ Carb."—[It was probably intended to have been written "Sodæ 1½ Carb., that is *Sodæ sesquicarbonas*.]

Mr. Cattan has sent us a communication on the subject of the electric light, from which it appears that he had purposed practically applying it for artificial illumination some years ago. The theoretical views contained in his paper are too speculative for our pages.

A. B. L.—*Diseases of the Skin*, by Erasmus Wilson, F. R. S., published by Churchill, price 12*s*., or with coloured plates, 28*s*.

Vox.—We do not know when the next volume of *Parnell's Applied Chemistry* will be published.

Juvenis.—*Fownes's Manual of Chemistry*. The figures in the first column alluded to represent the equivalents or combining proportions; those in the second column are the per-centage proportions.

The Patent Medicine Licence.—A correspondent has drawn our attention to the injustice of the charge for a patent medicine licence, observing, that a Chemist in a small village, within the limits of the twopenny post, pays £2, which is as much as a wholesale dealer in London, while the charge in country villages is 5*s*.

We have received several letters on Accidental Poisoning, with suggestions for its prevention. Two of these were in type, but want of space prevents their insertion this month.

Three correspondents have sent formula for incense; we defer the publication in order to make some experiments and report the result.

ERRATA.

In quoting from the *Lancet* of November 4, an extract of Dr. Wilson's letter, we omitted to state that the letter was written on the 10th of October, and addressed to the Cholera Committee of the College of Physicians. We also regret the following errata :—

Page 256, sixth line of the quotation, the word *and* is omitted.

Last line of the same paragraph, *for* ripe, *read* rife.

Page 257, fifth line from the end of the quotation, *for* jalap, *read* julep.

Page 271, ninth line from the bottom, *for* (Exp. 2, *e*.), *read* (Exp. 2, *c*.).

Page 281, *for* Johnson, Richard *W*. D., *read* Johnson, Richard *Hison* Daly.

Page 296, *for* Messrs. Abel and *Brownley*, *read* Messrs. Abel and Rowney.

Advertisements to Mr. Churchill, Princes Street, Soho.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the Editor, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

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ACCIDENTS IN DISPENSING MEDICINES.

Few avocations are attended with greater responsibility than that of prescribing or dispensing medicines, and it is impossible to impress too strongly on the minds of those who are thus engaged, the importance of accuracy and care. That all fallible beings are liable to accident, is a truism, but this does not remove the responsibility when an accident occurs. It may serve to explain, and in some degree to extenuate, but it does not exonerate. Even if it be impossible to offer any restitution except an apology, an apology is a debt, and levity or indifference a crime.

We make this observation in reference to the conduct of the assistant in the following case, which is quoted from the *Times*.

Guildhall.—Mr. Hooper, the Chemist and Druggist residing by London-bridge, appeared before Sir George Carroll under the following circumstances :—

On Monday last Mr. M'Dougall, surgeon, made an application to the sitting Alderman for his advice, and stated, that having a patient from the country placed under his care, he, in the course of his professional attendance, considered it necessary to give a double dose of medicine of a sedative character, the prescription of which he wrote, directing that it should be taken at bed-time. It was sent to Mr. Hooper's, and one of the assistants, instead of using camphorated water and henbane, made the mixture up of henbane, opium, and spirits, and had it been taken, his patient would have been killed ; but the most fortunate circumstance was, that the assistant made a further mistake by writing on the bottle the word "Mixture," instead of "The draught, to be taken at bed-time," in consequence of which it was not taken. On calling twice he could not see Mr. Hooper, and the assistant treated the affair with great levity, saying it was "only a mistake."

The *Alderman* granted a summons for ignorance or wilful negligence in allowing the prescription to be made up.

Mr. Wire attended, and said that Mr. Hooper, who was then present, appeared, not to defend the summons, but to clear his own character. An explanation of the facts of the case had been given to Mr. M'Dougall, and he was perfectly satisfied ; but, as a report of the application had appeared in the newspapers, it was necessary that an explanation should be as publicly given. Mr. Hooper's mode of conducting business was this—that if he should not happen to be at home to make up a prescription, his assistants were not to do so, but to send it to a neighbouring Chemist. In this instance one of them had departed from that rule, and it was with deep regret that Mr. Hooper was obliged to say so. However, he had taken precautions that, for the future, such a mistake should not occur again. With respect to Mr. M'Dougall having called twice, and been told

that Mr. Hooper was not within, that gentleman was perfectly ignorant of the whole affair until he received the summons, and he had every reason to believe that on each occasion the assistant had denied him for the purpose of screening himself. Under all the circumstances, he (Mr. Wire) thought there was no occasion to trouble the alderman with going into evidence which might eventually turn out to be not within his power of deciding.

Sir George Carroll asked if the complainant was satisfied after hearing Mr. Wire's explanation ?

Mr. M'Dougall said he was. His only object in summoning Mr. Hooper was to further the object which the medical profession generally were exerting themselves for, and compel Chemists and Druggists to undergo an examination, and also that their assistants should pass through the same ordeal. It was true that a Pharmaceutical Society existed which had a great number of members ; but the fault was, that they had no Act of Parliament, and therefore examinations were not compulsory. On the last occasion he made a slight error in stating that the bottle was a two-ounce one, whereas it would only contain an ounce and a half, and therefore there could be but an ounce of paregoric.

Sir George Carroll.—Would that quantity have had the same effect ?

Mr. M'Dougall.—The effect would have been the same, but I am now perfectly satisfied with the explanation given.

The Chief Clerk intimated to the Alderman that the assistant was already dismissed from Mr. Hooper's service.

Sir George Carroll said the public were much indebted to Mr. M'Dougall for calling the magistrate's attention to so serious a subject, where the lives of so many were at the mercy of such persons. Mr. Hooper, he thought, had given a very satisfactory explanation through his legal adviser, and therefore the summons was dismissed.—*The Times*, Jan. 13.

In the above case the patient sustained no injury from the mistake, because the medicine was not taken; but the levity of the assistant brought down upon the head of his employer the punishment of a needless exposure. The annoyance felt by the medical practitioner was natural, as he had informed the friends of the patient that the prescription contained a double dose of the opiate, and if the patient had taken the medicine *as prepared*, and had died in consequence, the event would have been attributed to the "double dose," the only evidence of the real state of the case having been swallowed. Thus, the character of the medical man, as well as the life of the patient, was at stake. Yet the young man, instead of expressing a becoming sorrow at his accident, treated it with indifference, observing that it was only a mistake, and, as we are informed, appeared to think he had nothing to do but to return the money, which he threw down on the counter, by way of settling the business !

Under these circumstances, we say, it was natural that the medical practitioner should feel annoyed, but, we think, that before adopting the severe step of applying to the sitting Alderman, he should have seen the master of the shop, who, it appears, was in ignorance of the transaction until the moment that he received the summons to attend at Guildhall.

It is an old saying, that "persons who live in glass-houses should be careful how they begin to throw stones." Supposing the case to have been reversed, and a poisonous dose ordered by mistake in a prescription, a medical man would be rather surprised to receive a summons to attend at Guildhall. He would say, "This is sharp practice; the Chemist might have called privately, and given me the opportunity of rectifying the error without compromising my character with the patient." True, this is what Chemists usually do in such cases; but Mr. M'Dougall has set them a different example, and we hope, for his sake, that he will not have an accident himself, or if he should be so unfortunate, we hope his prescription will fall into the hands of a merciful Chemist.

It is the duty of the dispensing Chemist not only to use every precaution against mistakes himself, but to prevent mischief arising from any oversight in prescriptions. He should consider that there is between himself and the prescriber a mutual confidence which is sacred—not in reference to culpable recklessness on either side, which on public grounds might demand exposure—but in regard to casualties purely accidental, from the publication of which no advantage could arise. In these cases, reciprocal forbearance is a Christian virtue. We fully agree with Mr. M'Dougall in the opinion that the examination of Chemists and Druggists ought to be enforced by Act of Parliament, for the protection of themselves as well as the public. It is notorious that a mistake on the part of a Chemist is visited much more severely than an oversight of equal magnitude on the part of a medical man, and the reason is obvious. The medical man has passed an examination, he is a qualified practitioner, it is therefore presumed that his mistake is a casual misadventure. But the Chemist is not recognized by law as a qualified man, he has passed no examination, and the only protection the public enjoy in regard to his qualification is the responsibility arising from any deriliction of duty. Consequently, he must adduce evidence of his individual competence before he can put in the plea which the medical practitioner has always at command. To place the case in a stronger light—when a medical man mis-writes a prescription, it is presumed that it was a mere oversight, unless it could be positively proved to have arisen from culpable ignorance or recklessness. When a Chemist mis-reads a prescription, it is inferred that he is culpably ignorant, unless it can be positively proved that the error was a mere oversight.

The following dialogue occurred about fifteen years ago between a Physician and a Chemist, in reference to a prescription in which ʒij of subcarbonate of potash had been ordered in a draught,

instead of ℈ij, to be taken with an ounce of lemon juice :—*Chemist.* "I am sorry to trouble you, but will you have the kindness to inform me whether you intended to order ʒij of the potash?"—*M.D.* "Have you any objection to it?"—*C.* "Not at all, if you say that it is right."—*M.D.* "Then why do you come to me about it?"—*C.* "Because it is an unusually large dose, and I thought it was an oversight."—*M.D.* "And what harm would it have done?"—*C.* "If you say it would do no harm, I am perfectly satisfied ; I am sorry to have troubled you—good morning." —*M.D.* "Stay young man, let me look at the prescription—you think this is too much, do you ? how much do you think it ought to be?"—*C.* It would be presumption in me to dictate to you ; I merely asked the question, but I fancied you had intended it for ℈ij.—*M.D.* "So you think it ought to be ℈ij ; very well—you may have it your own way—I'll alter it."

We ought not to dismiss the case of Mr. Hooper without expressing surprize at his explanation, which to us appears to be the most mysterious part of the transaction, although to Mr. M'Dougall and the sitting Alderman, it was "very satisfactory."

If the assistants be incompetent to dispense prescriptions, in what capacity do they stand behind a dispensing counter? In a shop where two assistants are kept, the practice of sending prescriptions to a neighbouring Chemist to be dispensed, on the ground of incompetence at home, is altogether unaccountable.

It is to be regretted that Mr. Hooper did not appear himself to answer to the charge ; we feel persuaded that the lawyer must have misunderstood his brief and made a mistake in the defence. For the credit of our profession, we hope this was the case. A lawyer may be pardoned for not being practically conversant with the management of a Chemist's dispensing business, and on the supposition that the defence was got up by him, we may infer that some indulgence is due to his client.

THE CHOLERA.

The pertinacity with which some Boards of Guardians have neglected or resisted the general recommendations for the prevention of Cholera, has received a practical condemnation in the fearful outbreak of this disorder in the juvenile establishment at Tooting. Those who asserted that this dispensation of Providence was "nothing more than a job got up by the doctors," have no longer even the shadow of a negative argument to support their profane incredulity.

Mr. Drouet's establishment is a suburban nursery for the redundant pauper children of the London parishes, and at the time the cholera appeared among them, the number of inmates exceeded 1400. Mr. Kite, who was appointed resident medical officer early in November, states in

his evidence, that on entering the establishment he found no symptoms of bowel complaint; but opthalmia, scrofula, the itch, and other cutaneous diseases prevailed to a great extent. The first case of cholera was observed about the 28th of December, after which it rapidly increased. On the 30th there was 1 death; on the 31st, 3; on the 1st of January, 3; on the 2nd, 7; on the 3rd, 5; on the 4th, 12; on the 5th, 19; on the 6th, 14; on the 7th, 11; on the 8th, 20; on the 9th 14; on the 10th, 10; on the 11th, 5; on the 12th, 9; on the 13th, 8; from that day to the 19th, 9; making a total of 150. This number is exclusive of those who died after their removal to their respective parishes. On the 20th, we were informed that only 300 children remained in the establishment, of whom only forty were patients, and that no fresh case had appeared during the past week.

Various reports have been in circulation respecting the over-crowding and under-feeding of the children, and it is probable that some exaggeration may have been mixed up with the truth. But the evidence, even in its mildest form, is sufficient to excite a shudder, and no less astonishment, at the fact, that such abuses could exist without the cognizance of the Board of Health, a body possessing unlimited powers of inspection, and created for the express purpose of watching over the sanitory condition of the poor, especially in establishments where large numbers are congregated together.

The Board of Health, however, cannot be accused of inactivity in rectifying the evil when its existence became known, and this vigilance has been extended to other pauper institutions of a similar description, additional medical officers having been appointed to make the needful inspections. Mr. Grainger, who was officially appointed to visit the Tooting nursery, and report, gave a lamentable account of the condition in which he found the inmates. Although it had been asserted that no premonitory symptoms had been observed, it appeared on investigation that as early as the 15th Dec. several cases of diarrhœa had occured, attended with vomiting and collapse, yet no precautions were taken, and no change was made in the diet and clothing of the children, until the actual appearance of the cholera in its most severe form. The diet was extremely deficient in nutritive qualities, consisting chiefly of meagre soup with vegetables, porridge (which is described as resembling bill-sticker's paste), potatoes sometimes diseased, a moderate quantity of tough beef, and an insufficient allowance of bread.

Mr. Grainger states in his report, that on entering the wards appropriated to cholera patients, he was struck with the extreme closeness, oppression, and foulness of the air, the rooms being utterly disproportioned to the number of patients:—

In a room, for example, sixteen feet long, twelve feet wide, and less than eight feet high, there were five beds occupied by eleven children, all ill with cholera. In another room of the same dimensions there were four beds and thirteen children. In a third room, eighteen feet by sixteen, and eight feet high, there were nine beds with sixteen patients, two of the beds having three patients in each, a frequent occurrence. The lighting and ventilation of these wards was totally insufficient.

On the boys' side there was a room with eighteen beds nearly touching each other, in which were thirty-five boys, all ill with the cholera; twenty-

five being in bed, two in a bed, and ten sitting round the fire convalescent.

On the girls' side there was only one regular nurse, who was passing in and out to attend the children in several wards ; and on the boys' side in the ward above-mentioned, containing thirty-five patients, there was only one nurse (a man) in attendance. The children were continually vomiting in the beds and on the floor, and consequently the sheets, bedding, and floor, were covered with the discharges—and no efficient aid was in a single case afforded to those suffering children.

The various appliances required for the treatment of this disorder were either totally wanting or quite inadequate. In the surgery there was only one pair of scales, one spatula, and some of the medicines were not labelled at all.

Mr. Popham, another medical witness, states that he found everything in great confusion—in the cholera wards for boys four in a bed, some dying, others in a state of collapse, some recently brought in and placed in the beds with others. In the girls' cholera wards generally four in a bed—a foul stench in all the wards—the floors wet with vomited matters owing to the insufficiency of nurses and attendants. In two rooms on the boys' side he found sixty-four boys and twenty-eight beds, some of the beds being empty for the reception of fresh cases.

The imagination could scarcely conjure up a more wretched picture of human misery and devastation than that which is furnished by Mr. Grainger's report, and the evidence given by other medical men, as well as some of the children at the several inquests.

The verdict of the jury, on the body of one of the St. Pancras children, is worthy of notice ; although rather an unusual composition it is, we believe, fully justified by the facts of the case :—

" We find that John Joseph Coster died from malignant cholera, that disease occurring in him at a time when he was suffering from the effects of inefficient diet, deficient warmth of clothing, and impure air, at Surrey-hall, Tooting. And the jury add to their verdict an expression of their regret that the directors of the poor of St. Pancras did not bind Mr. Drouet, the proprietor of Surrey-hall, to fulfil his duty to such a large number of children as they had confided to his care under a written and more definite contract than appears to have existed between them. At the same time the jury most emphatically condemn the practice of farming pauper children in the houses of strangers, because the system engendered by it affords to unprincipled persons disastrous opportunities of defrauding the poor children of their proper food and clothing, in a manner the wickedness and evil consequences of which do not seem to become publicly apparent, nor to produce such adequate effect on the minds of directors and guardians of the poor as to lead to correction of the evil, until disease has produced the most awful effects on the helpless population of such establishments."

With respect to the practice of farming pauper children in the manner described, we may observe, that it is *possible*, by judicious management, to provide adequate nourishment and accommodation on the terms prescribed, namely, 4*s*. 6*d*. per week for each child; but this duty, *if honestly performed*, would not, we think, afford a profit sufficient to induce a person to undertake the office as a speculation. Consequently, such an arrangement demands the greatest vigilance on the part of those who are responsible for the welfare of the children. The charge at a similar establishment at Margate, to which children are occasionally sent from the parish of Marylebone, is 5*s*. a week, and the health of the children has generally been found to improve

in this asylum. An additional 6*d.* a week has been recently voted by the Board of Guardians, on account of the extra diet and clothing recommended under existing circumstances for general adoption.

Reverting to the calamity at Tooting, the evidence informs us, that in addition to the predisposing causes above-mentioned, a foul open drain emits its noxious exhalations at the back of the premises, thus completing the arrangements for the promotion of cholera according to the most approved system! We are told that the condition of this nuisance is so offensive, that it is considered unsafe to remove it. This would be a favourable opportunity for the three rival deoderisers to test their respective antidotes.

Some discussion has arisen as to the propriety of removing the children from Tooting during the prevalence of the epidemic, and considerable alarm has been occasioned by the appropriation of temporary wards in London for their reception. A building having been taken in Ogle-street, in the parish of Marylebone, for some of these children, the subject was introduced to the notice of the parochial authorities, but it was found that they had no power to interfere. The Board of Health having decided against the contagious theory, and the quarantine laws in regard to cholera being suspended, the only question which remained to be considered was, whether the accommodation provided was suitable and adequate to the number of inmates, and in the absence of any evidence to the contrary, no proceedings could be taken.

It is satisfactory, however, to observe, that the disorder has not spread to any serious extent, and that it appears to be subsiding in the Tooting nursery. We learn from the evidence of the Registrar-General, and from other sources, that the neighbourhood of Tooting is generally healthy, the cholera being confined to the above establishment.

TREATMENT OF CHOLERA IN INDIA.

We have received from Mr. W. Johnson, of Bombay, a portion of the *Government Gazette*, containing the following official instructions for the treatment of cholera. From this document it would appear that the practice with reference to cholera in that part of the world is altogether empirical—the several rules and instructions being laid down with the same kind of precision that would be observed in reference to any mechanical art, the doses being regulated on the sliding scale.

TREATMENT OF CHOLERA.

Notice is hereby given, that the following are the instructions, which have been issued by the Police Surgeon to the Native Doctors employed by Government, for the relief of persons attacked by Cholera in Bombay, and also the composition, uses, and doses of the medicines dispensed by those individuals.

By order of the Medical Board,

J. Burnes,
Secretary Med. Board.

Bombay, June 2d, 1845.

INSTRUCTIONS TO THE NATIVE DOCTORS REGARDING THE TREATMENT OF CHOLERA.

Bleeding.—This may be employed if the pulse be easily felt and cramps be very severe ; but in no case when the pulse is almost gone and cramps are not present.

Mixture with Opium.—Of this a dose suited to the age is to be given in a little water, at the commencement of the treatment, and if the purging continue, it may be repeated once.

Pills.—One is to be given to an adult, and half a pill to a person 15 years old, to check vomiting, if the mixture be rejected, and for three-quarters of an hour after taking the pill, nothing is to be swallowed. No pill is to be given to a person under 15 years of age.

Mixture without Opium.—Of this a dose suited to the age is to be given regularly every hour or two hours, after purging and vomiting have been checked by the preceding medicines, until the pulse improve and the skin become warm.

Hot bricks or bags of hot sand are to be applied along the spine and to the legs, the legs and arms being at the same time constantly rubbed.

Drink.—The patient is not to be allowed the free use of water, as drinking it will keep up vomiting and prevent the medicines being retained, a spoonful only of conjee or water may be given now and then.

CHOLERA MIXTURE WITH OPIUM.

Mix. Of Solution of Ammonia.....9½ drachms.
Essence of Peppermint... 5 "
Tincture of Opium .....19 "
Brandy 19 ounces and ... 6 "

N.B.—Of this mixture one ounce contains 47½ minims of tincture of opium, and ten minims contain almost one minim of the tincture.

CHOLERA MIXTURE WITHOUT OPIUM.

Mix. Of Solution of Ammonia ..... 1 oz.
Compound Tincture of Cinnamon 1½ "
Water.....21½ "

N.B.—Of this mixture one ounce contains 20 minims of the solution of Ammonia, and 25 minims contain 1¼ minims of the solution.

CHOLERA PILLS.

Extract of Opium..... 36 grains.
Powder of black Pepper ..... 48 "
N.B.—Each pill contains 1½ grains of opium.

DOSES—CHOLERA MIXTURE WITH OPIUM.

Dose at adult age 1 ounce, or two table spoonfuls in water.

16 years	½	ounce,	or	one table spoonful.	
8 "	90	minims,	or	180	drops.
4 "	40	"		80	"
2 "	20	"		40	"
1 "	10	"		20	"

To persons above eight years these doses may be repeated once only if no pill shall have been given; and to persons below eight years a half dose only may be given, if the first dose shall have been insufficient to check vomiting and purging.

CHOLERA MIXTURE WITHOUT OPIUM.

Dose at adult age 1 ounce, or two table spoonfuls in as much water.
16 years ½ ounce, or one table spoonful in water.
8 " ¼ ounce, or two tea spoonfuls in water.
4 " 60 drops in a little water.
2 " 30 " "
1 " 15 " "

These doses may be repeated every one or two hours after vomiting and purging have ceased, until the pulse improve and the skin become warm.

(Signed) A. H. Leith, *Police Surgeon.*

THE MEDICAL TREATMENT OF PAUPERS.

The inefficiency of the arrangements for medical treatment at the Tooting nursery affords fresh evidence of the necessity of investigation in regard to the medical relief afforded to the poor in general. It appears that until November last, when the establishment contained upwards of 1000 inmates, there was no resident medical officer. After the appointment of this officer, the number of children was increased, but he was not consulted as to the diet, clothing, or general arrangements, although he admitted in his evidence that he considered the over-crowding extremely injurious, and the diet and clothing insufficient. The prevalence of cutaneous and other diseases was extreme, yet so little anxiety did this appear to create, that cases of itch were frequently not brought under the notice of the medical officer, it being remarked at one of the inquests that if the children were cured, they soon caught the disorder again. The Coroner, on viewing the body of one of the children observed, that he had never seen the itch in so aggravated a form. After what has transpired, it is not likely that these abuses will continue to prevail, and the establishment will be placed in future under proper controul.

The inadequate remuneration of Union Surgeons, and the unreasonable—in some cases impossible—duties imposed on them, should be constantly brought before the notice of the public, until a reform is effected. When a practitioner is appointed to attend the poor of several parishes at considerable distance from each other, at a salary which will scarcely cover his travelling expences and the cost of the medicines, which is the case in many places, it cannot be expected that that attention will be paid to the wants of the sick poor, which it is the duty of the guardians to secure. It appears to be the general object to screw down the Union Surgeon to the lowest possible stipend, taking advantage of the fact that such appointments are sometimes accepted even at a loss, to avoid the introduction of a rival practitioner into the parish, which might be a still more serious injury. Thus medical men are intimidated into submission; they undertake an amount of labour which they cannot reasonably be expected to perform, and in spite of their most strenuous exertions, the wants of the sick poor are too often imperfectly supplied.

Those whose official duties as guardians or overseers bring them in constant communication with the destitute poor, are so frequently dis-

gusted with the numerous cases of profligate imposition which come under their notice, that their feelings become to a certain extent case-hardened, and they habitually view with suspicion, if not severity, the whole class of applicants for relief. A wide distinction, however, should be made between able-bodied paupers in robust health, and those who are the victims of disease or other infirmity, incapacitating them from labour. On the sick-bed, all are objects of compassion, and all are entitled to receive as much attention as it is possible to afford to persons in their situation in life. It is cruel as well as useless to neglect or upbraid a sick and helpless man because his own imprudence may have brought him into that condition. Humanity, no less than economy, dictates that the primary object should be, to effect as speedy a cure as possible, reserving severe moral discipline until a time when it may have a chance of producing some effect.

It is undoubtedly the duty of Boards of Guardians to provide for the poor under their care the best medical attendance which the means at command will afford. An apparent saving in the medical department of a parish or union is a false economy, if from defective arrangements the patients be neglected, and their recovery thereby protracted, which may involve the parish in additional expense for the maintenance of their families.

When superior medical attendance may be had, without additional expense, it is difficult to imagine any motive for withholding this advantage from the sick poor; yet even this extraordinary policy has its advocates in the parish of Marylebone, where strong efforts have been made to dispense with the services of the honorary medical officers at the workhouse, leaving the patients in the infirmary (the number of whom averages about three hundred) under the sole care of one stipendiary medical officer.

The primary question under consideration, was, whether a vacancy occasioned by the decease of one of the honorary Physicians should be filled up, which proposal has been met by a violent opposition. A few years ago, a similar controversy arose respecting a vacancy which occurred in consequence of the resignation of one of the honorary Surgeons. In that instance, the opposition was successful, and the advocates of this "retrenchment" are desirous of continuing the same policy whenever a vacancy occurs in order to get rid of the honorary staff altogether. It is certainly a novel incident in the history of the medical institutions of this country, that while eminent Physicians and Surgeons are willing to give their services gratuitously for the benefit of the sick poor in a large infirmary, the Board of Guardians, instead of awarding a vote of thanks, appoint a committee to consider whether such services be worth having or not, and many hours are wasted in the discussion of this remarkable proposition!!

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

CONVERSAZIONE.

On Wednesday evening the 17th of January, the *Conversazione*, which had been previously announced, was held at the house of the Society. The Members and Associates of the Society, together with many medical and other scientific men, began to assemble soon after eight o'clock, and the rooms continued pretty well filled until a late hour. The objects of interest provided for the occasion consisted principally of chemical and pharmaceutical apparatus, which were either of recent invention, or were not generally known to the Pharmaceutists of this country.

The Council were indebted to Professor Graham for the means of exhibiting the recently invented apparatus of M. Natterer of Vienna, for the condensation of nitrous oxide and carbonic acid (see p. 389); also an apparatus for the continuous production of phosphoric acid by the combustion of phosphorus in a current of dry air; a model of the leaden chamber and furnace, used in the manufacture of oil of vitriol; and a soda furnace, such as is used in the manufacture of carbonate of soda from common salt.

To Mr. Griffin, of Baker Street, they were indebted for a large assortment of pharmaceutical apparatus, most of which was of German manufacture, and such as is commonly used by the Pharmaceutists in Germany, although but little known in this country. Among these were the *Beindorf Apparatus*, of which there were two or three different sizes. This is a kind of water-bath, admitting of a great number of different applications. It is almost universally employed by the Pharmaceutists throughout Germany for infusion, decoction, solution, distillation, and other processes in which heat is required. There were also several different kinds of condensers for distillation, some of German and others of English construction. The most simple and efficient of these Mr. Griffin calls the condenser with solid plunger. The object in the construction of this condenser has been to provide means for having it easily cleaned after any particular process, so that the next liquid condensed in it shall not be contaminated by the residue of the previous operation. Count Real's press; different kinds of percolators; instruments for cutting and chopping roots, herbs, leaves, &c.; hydrometers, and graduated tubes for centigrade testing, were among Mr. Griffin's apparatus. Most of these are described in Mohr and Redwood's *Practical Pharmacy*.

A complete model of a drug-mill and several forms of apparatus for sifting powders, attracted much attention.

To Mr. Button the Council were indebted for a very fine specimen of anhydrous sulphuric acid, and some German chemical apparatus.

To Messrs. Watkins and Hill, for some electrical apparatus.

Several lamps were also exhibited ; some for the combustion of coal-gas, others for oil and for coal-tar naphtha. Among these was an improved gas-burner by Mr. Clarke, of the Strand, and attached to it an enamelled glass for diffusing the light without casting a shadow ; and the *Holliday Lamp*, so called after its inventor, which is principally intended for out-of-door illumination.

During a great part of the evening, however, the light of the gas and oil lamps was completely thrown into the shade by the more brilliant *electric light*. An application for Mr. Staite's recently patented apparatus having proved unsuccessful, a Grove's battery of twenty-five cells, with an apparatus contrived by Mr. Warren De La Rue, and made by Newman, of Regent Street, for adjusting the charcoal points, was employed. The points which were found to answer best were made of a hard description of coke, which forms an incrustation on the inner surface of the gas-retorts. With the view of testing the intensity and purity of the light thus obtained, Mr. Malone, of Regent Street, took some Talbotype impressions, and he stated that the effects were produced more rapidly than they would have been by ordinary day-light. For a description of Mr. Staite's patent see page 390.

Mr. Darker exhibited and explained Wheatstone's polar clock, by which the hour of the day can be determined in cloudy weather by polarized light.

Mr. Deane, of Clapham, exhibited, by means of a microscope, the different kinds of magnesia which have been described in papers published by Dr. Pereira and by himself in previous numbers of this Journal ; also a specimen of *Valisneria spiralis*, in which the circulation was very beautifully shown.

In a glass-case on one of the tables there was a collection of specimens of native gold, supplied for the occasion by Mr. Tennant, of the Strand. Some of these specimens were of great magnitude and beauty, and among them were some recently brought from California.

A specimen of mannite, extracted from the juice of the Dandelion, by Messrs. Smith, of Edinburgh ; and a portrait of Dr. De Valangin, the inventor of " De Valangin's Solutio solventis mineralis," a preparation of arsenic, which, it is said, is to be introduced into the new London Pharmacopœia, were supplied by Dr. Pereira.

Among other objects present was a model of Dr. Arnott's new

pendulum ventilator, and the mechanical leech of MM. Alexandre and Co., of Paris. This apparatus is intended to supersede the use of leeches. It consists essentially of two parts—an instrument for puncturing the skin ; and another for promoting the flow of blood by removing atmospheric pressure from the punctured part. The puncture is effected by a lancet, the blade of which has the form of the cutting apparatus of the leech. This lancet is fixed in the mouth of a tube, and projects about the eighth of an inch beyond the edge of the tube. It may be elevated by a small lever, so that its point shall be within the tube, in which position it is secured by a catch. Attached to the opposite end of the tube by a piece of vulcanised Indian rubber, which acts as a spring, is a piston which is pressed down by a rod, and, on removing the pressure is drawn back by the Indian-rubber spring. The piston being pressed down the open end of the tube in which the lancet is fixed is placed over the part to be punctured: the pressure is now removed, when the piston is drawn back by the spring, and exhausting the air within the tube, the skin is forced up into the mouth of the tube. On loosening the lever by which the lancet has been elevated, the latter is drawn down by a spring, also of vulcanised Indian-rubber, so as to effect the puncture. The cutting instrument is now removed, and a glass tube with a piston similar to that already described, is placed over the puncture, the air within being exhausted so that the tube adheres to the part, and the blood flows freely into it. Half-a-dozen or a dozen tubes, each of which would draw as much blood as a large leech, might be thus attached in two or three minutes. The apparatus, consisting of a cutting instrument and six or twelve suction tubes, together with sundry implements for cleaning the lancet and tubes after use, are contained in a small case. It is very neatly got up, and, we understand from those who have used it, is very efficient. The idea, however, is not new : so long ago as the year 1813 the silver medal was awarded at the Society of Arts to Mr. J. Whitford, of St. Bartholomew's Hospital, for the invention of a somewhat similar apparatus for the same purpose. In Mr. Whitford's apparatus the exhaustion was effected by a syringe, which was found to be inconvenient. The use of vulcanised Indian-rubber springs, attached to the pistons, by which efficient suction-tubes are economically formed, is a great improvement in MM. Alexandre's apparatus.

BRISTOL CHEMISTS' ASSOCIATION.

SPRING SESSION, 1849.

LECTURES will be delivered on the following Friday evenings, at half-past Eight o'clock, at Tailor's Court, Broad Street :—

FEBRUARY 2 & 9.—On the Phenomenon of Crystallization, illustrated by experiments, and a variety of natural and artificial specimens. By F. W. Griffins, Esq.

MARCH 2 & 16.—On the Constitution of Salts. By Mr. R. W. Giles.

APRIL 13.—Subject not yet announced. Mr. R. A. Ferris.

APRIL 20.—Photography, with practical directions, illustrated by experiments, and a great variety of splendid pictures. By H. Owen, Esq.

ORIGINAL AND EXTRACTED ARTICLES.

ON COD-LIVER OIL.

BY JONATHAN PEREIRA, M.D., F.R.S.

THE great and daily increasing consumption of cod-liver oil renders all inquiries relating to this therapeutical agent interesting alike to the Physician and the Pharmaceutist. I think, therefore, that some account of the present state of our knowledge, with respect to the chemical nature of this oil, may not be unacceptable to the readers of the *Pharmaceutical Journal*, the more so, as no account of De Jongh's analysis of this oil has yet appeared in this Journal.

It may be well to remind my readers, that while some of the fish-oils * of commerce are obtained exclusively from the liver, others are procured from the adipose tissue diffused through the body of the animal generally. In the former, therefore, we are prepared to find bile constituents which are not obtainable from the latter.

In fishes, properly so-called, the distribution of oil in the body of the animal is not uniform. In the *Gadidæ* or Cod-tribe (common cod, dorse, coal-fish, pollack, burbot, ling, torsk, &c.), in the *Squalidæ* or Sharks, and in some other fishes, almost the whole adipose tissue of the animal is concentrated in the form of oil contained in the liver.† On the other hand, in the salmon, herring, sprat, and wolf-fish, the oil is more diffused through the body of the animal, and the liver is, comparatively speaking, devoid of it.

The oils obtained from the livers of the different species composing the tribe *Gadidæ*, appear to be very similar in their physical and chemical qualities, and there is good reason for believing that they

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* I use the term *fish-oils* in its popular and commercial acceptation, and include under it not only the oils obtained from fishes properly so-called, but also those procured from other aquatic animals, as the *cetacea* and seals.

† Professor Owen, in his *Lectures on the Comparative Anatomy and Physiology of the Vertebrate Animals* (Part 1, *Fishes*, p. 242, 1846) observes, that "the myriads of dog-fish captured and commonly rejected on our coasts, show that the fishermen have not yet taken full advantage of this anatomical fact, which exposes to them an abundant source of a pure and valuable oil."

agree in their medicinal properties. To all of them the term *oleum jecoris aselli*,‡ *oleum jecoris gadi*, or *cod-liver oil*,§ is indiscriminately applied, though it is commonly used, especially in this country, to indicate the oil procured from the liver of the common cod (*Gadus morrhua*, Cuv.). It would be better, therefore, to employ the term *oleum jecoris morrhuæ*, or simply *oleum morrhuæ*, when it is intended exclusively to designate the latter oil.

De Jongh in his *Disquisitio comparativa chemico-medica de tribus olei jecoris aselli speciebus*, published at Leyden in 1843, states that the Bergen (Norwegian) oil is principally obtained from three species, viz., the dorse (*Gadus callarias*), the coal-fish (*Gadus carbonarius*), and the pollack (*Gadus pollachius*), but chiefly from the first.

In general, continental writers distinguish three varieties of cod-liver oil, one white or pale yellow, a second brownish-yellow, a third dark-brown. But between the finest pale yellow or almost colourless oil, and the dark brown cod-oil used by curriers, there is an almost infinite variety of shades, so that no absolute difference can be founded on colour only.

De Jongh made, in Mulder's laboratory, a very elaborate analysis of three kinds of cod-liver oil, the properties of which he thus describes :—

Three kinds of cod-liver oil are admitted and described by the writer just quoted. These are *pale*, *pale brown*, and *brown*.

1. *Pale cod-liver oil.*—Golden yellow ; odour not disagreeable ; not bitter, but leaving in the throat a somewhat acrid fishy taste ; re-acts feebly as an acid ; sp. gr. 0.923 at 63.°5. Fahr. Cold alcohol dissolves from 2.5 to 2.7 per cent. of the oil ; hot alcohol from 3.5 to 4.5 per cent. ; in ether it is soluble in all proportions.

2. *Pale brown cod-liver oil.*—Colour that of Malaga wine ; odour not disagreeable ; bitterish, leaving a slightly acrid fishy taste in the throat ; re-acts feebly as an acid ; sp. gr. 0.924 at 63.°5. Fahr. Cold alcohol dissolves from 2.8 to 3.2 per cent. of oil ; hot alcohol from 6.5 to 6.8 per cent. Ether dissolves it in all proportions.

3. *Dark brown cod-liver oil.*—Dark brown, is transmitted light greenish, in thin layers transparent ; odour disagreeable, empyreumatic ; taste bitter and empyreumatic, leaving behind in the fauces an acrid sensation ; re-acts feebly as an acid ; sp. gr. 0.929 at 63.°5. Fahr.

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‡ Pliny (*Hist. Nat.*, lib. ix, cap. 28) states that there were two kinds of fishes called *aselli*, one smaller, termed *callariæ*, the other found in deep water and denominated *bacchi* ; the latter were preferred to the former. Varro (*Opera Omnia*, p. 21, Durdrechti, 1619) says that these fishes derived their name *aselli*, from their resemblance in colour to the ass.

By some later writers, the term *asellus* has been extended to several species of the cod tribe. Thus, the common cod is called *asellus major* ; the ling, *asellus longus* ; the coal-fish, *asellus niger* ; the whiting, *asellus albus* ; the dorse, *asellus striatus* ; the pollack, *asellus haifingo*, &c.

A few years ago, a writer in one of the medical journals, mistaking the meaning of the word *asellus*, gravely announced, that "*oil of the liver of the ass*," had been introduced, as a remedial agent, into Germany, from Sweden !

§ The term *cod-liver oil* is here used to indicate the oil obtained from the livers of any of the cod-tribe. In this sense it is about equivalent to the Latin term *oleum jecoris aselli*.

Cold alcohol dissolves from 5.9 to 6.5 per cent. of it; hot alcohol from 6.5 to 6.9 per cent. In ether it is soluble in all proportions.

De Jongh found the principal constituents of these oils to be *oleate* and *margarate of glycerine*, possessing the usual properties. But they also contained *butyric* and *acetic acids*, *the principal constituents of the bile* (bilifellinic acid, bilifulvin, and cholic acid), *some peculiar principles* (among which was the substance called *gaduin*) and not quite one per cent. of *salts*, containing iodine, chlorine, and traces of bromine. Moreover, he found that the oils always contained free *phosphorus*.

The following table shows the proportions of the constituents in the three kinds of oil :—

Constituents.	Pale Oil.	Pale brown Oil.	Brown Oil.
Oleic acid (with *Gaduin* and two other substances)	74.03300	71.75700	69.78500
Margaric acid	11.75700	15.42100	16.14500
Glycerine	10.17700	9.07300	9.71100
Butyric acid	0.07436	—	0.15875
Acetic acid	0.04571	—	0.12506
Fellinic and cholic acids, with a small quantity of margarine, oleine, and bilifulvin	0.04300	0.06200	0.29900
Bilifulvin, bilifellinic acid, and two peculiar substances	0.26800	0.44500	0.87600
A peculiar substance, soluble in alcohol	0.00600	0.01300	0.03800
A peculiar substance, insoluble in water, alcohol, and ether	0.00100	0.00200	0.00500
Iodine	0.03740	0.04060	0.02950
Chlorine, and traces of bromine	0.14880	0.15880	0.08400
Phosphoric acid	0.09135	0.07890	0.05365
Sulphuric acid	0.07100	0.08595	0.01010
Phosphorus	0.02125	0.01136	0.00754
Lime	0.15150	0.16780	0.08170
Magnesia	0.00880	0.01230	0.00380
Soda	0.05540	0.06810	0.01790
Iron		—	a trace
Loss	3.00943	2.60319	2.56900
Cod-liver oil	100.00000	100.00000	100.00000

By reference to this table, there will be observed some slight differences in the composition of the three kinds of oil. Whether these are constant or accidental, further investigations are required to determine. But from De Jongh's analyses, it would appear that the *pale* oil is richest in oleic acid and glycerine—that the *brown* oil contains the largest amount of margaric, butyric, and acetic acids, and of the substances peculiar to cod-liver oil—and, lastly, that the *pale brown* oil is richest in iodine and saline matters.

I now proceed to notice in detail some of the substances which enter into the composition of this oil.

1. *Of Gaduin.*—For the discovery of this substance in cod-liver oil, we are indebted to De Jongh. It may be obtained as follows: Saponify cod-liver oil by means of caustic soda, and decompose the soap thus obtained, by means of acetate of lead. The resulting lead-soap is to be treated with ether, which takes up oleate of lead and gaduin, and leaves undissolved the margarate of lead. The ethereal solution is dark brown. If it be decomposed by sulphuric acid, brown oleic acid is set free. The brown colour of this acid is owing to the presence of gaduin. To separate the latter, add excess of caustic soda to the oleic acid, by which oleate of soda is formed. This is insoluble in the excess of caustic soda. It is to be dissolved in alcohol, and the alcoholic solution cooled below 32° Fahr., by which the oleate of soda separates, leaving for the most part, the gaduin in solution. By the addition of sulphuric acid, the gaduin is precipitated from its solution.

Gaduin is a brown substance which is soluble in alcohol, but is rendered insoluble by evaporating its solution to dryness. The alcoholic solution yields, on the addition of neutral acetate of lead, a copious precipitate, composed of $C_{35}\ H_{22}\ O$, Pb O. If this lead salt be digested with carbonate of soda, it is decomposed, and a soda salt is obtained in solution, from which sulphuric acid precipitates a brown acid. This when dried at 288° Fahr., was found to have the following composition: $C_{35}\ H_{23}\ O_9$.

Gaduin is odourless, tasteless, and of a dark brown colour. It is completely insoluble in water, but is for the most part soluble in both ether and alcohol. Its insoluble portion augments every time the solution is evaporated. When dry it is brittle and pulverizable. It is insoluble in both nitric and hydrochloric acids. In sulphuric acid it dissolves, and acquires a blood red colour, but from this solution it is precipitated both by water and alkalies. It is soluble in alkalies. Diffused through water and treated with chlorine it becomes decolourized. In burning, yields an odour first of acetic acid, afterwards of cod-oil, and leaves behind a small quantity of ash.

The *insoluble modification of gaduin*, to which allusion has already been made, is blackish-brown, pulverizable, insoluble in water, alcohol, ether and diluted sulphuric acid, but by concentrated sulphuric and hydrochloric acid is converted into a black powder, without freely dissolving: in hot nitric acid it gradually and completely dissolves. It dissolves in alkalies, forming a red-coloured solution. In burning, it evolves the odour of acetic acid, and leaves about 0.822 per cent. of ashes. When dried at 238° F., is composition $C_{39}\ H_{26}\ O_{12} = C_{35}\ H_{22}\ O_8 + C_4\ H_3\ O_3 + HO$: that is gaduin ($C_{35}\ H_{22}\ O_8$, HO) combined with acetic acid ($C_4\ H_3\ H_3$). But De Jongh's formula scarcely agrees with his experimental result. He says that analysis gave him 7.04 per cent. of hydrogen, whereas his formula indicates about 7.3 per cent.

Berzelius states that when he read De Jongh's account of gaduin, he was struck with the analogy of the reactions of this substance with those of bilifulvic acid, and he tells us that he was disposed to think that gaduin is primitive bilifulvic acid, and that the reddish-brown substance, insoluble both in alcohol and water, which he (Berzelius) separated from bilifulvin by long and numerous operations, is only the insoluble modification of gaduin. This point, however, at present remains undetermined.

Gaduin is contained in all the three varieties of oil examined by

De Jongh. At first it is yellow, but under the influence of atmospheric air it acquires a brown colour.

2. *Fatty acids; margaric and oleic acids.*—These acids, as obtained from cod-liver oil, do not appear to differ in their nature and composition from the same acids procured from other sources. De Jongh analysed them in the form of margarate and oleate of lead. The results were as follows:—

Margarate of lead..... $C_{34}\ H_{33}\ O_3$, PbO.
Oleate of lead ..... $C_{44}\ H_{39}\ O_4$, PbO.

3. *Glycerine.*—This was obtained by saponifying cod-liver oil by caustic soda. The residual lye was decanted from the soda-soap, saturated with sulphuric acid, and the sulphate of soda separated by crystallization. The residual glycerine was compared with glycerine procured from olive-oil and lead, and found to be darker coloured. All these kinds of glycerine were decolorized by adding basic acetate of lead to the glycerine solution, though they again became coloured when submitted to evaporation.

4. *Bile constituents.*—When cod-liver oil is shaken with water, an emulsion is obtained from which the oil slowly separates. The aqueous liquid becomes clear by filtration. That which had been obtained by shaking the brown oil with water was coloured and empyreumatic; but the other kinds of oil did not colour the water. The liquid invariably had a slightly acid re-action, and the oil which had been shaken with it was clearer, had a feebler odour, and re-acted less powerfully as an acid. By boiling the oils with water, the same results were obtained. By evaporation, the aqueous fluids from all the three kinds of oil yielded a reddish-brown extract, which, softened by heat, was slightly soluble in water, was more soluble in ether, and completely so in alcohol. Alkaline solutions dissolved it, and acids threw it down again in the form of a reddish-brown flocculent precipitate. The extracts had a peculiar odour and a bitterish taste. The quantities obtained from the different kinds of oil were as follows:—

	With cold water.		With hot water.
Pale oil.....	0.607 per cent.	...	0.513 per cent.
Clear brown oil	0.890 "	...	0.849 "
Brown oil	1.288 "	...	1.256 "

When successively treated with ether, alcohol, and dilute spirit, all these extracts yielded the same results.

By ether, a reddish-brown, transparent, glutinous extract was obtained, which melted by heat, stained paper, and had the odour and taste of bile. After some time, small crystals made their appearance in it. It was slightly soluble in water, but readily so in ether as well as in alcohol. A solution of carbonate of ammonia being added to its ethereal solution caused the separation of the mixture into two layers, an upper turbid layer, which by evaporation yielded some drops of *olein*, some crystals of *margarin*, and a *brownish mass* which was identical with that procured by the evaporation of the lower layer. This brown mass had a bitter taste, was separated by water into a soluble and insoluble portion, and consisted of *fellinate* and *cholate of ammonia*.

The extract which had been exhausted by ether, yielded to alcohol a blackish-brown, odourless, bitter, shining, hygroscopic mass, which

dissolved with difficulty in water, and consisted of *biliverdin, bilifulvin*, and *bilifellinic acid.*

Dilute spirit removed from the residual extract a black shining substance, soluble in alkalies, concentrated sulphuric acid, and hot acetic acid, but insoluble in nitric and hydrochloric acids. From its alcoholic solution, baryta-water and acetate of lead precipitated it of a brown colour. It left no residue by burning.

The residue of the aqueous extract, left after the action of the three above-mentioned solvents, contained an *organic substance* (whose nature has not been determined) and *inorganic salts*, in which chlorine, phosphoric and sulphuric acids, lime, magnesia, and soda were found, but no potash or iodine.

5. *Iodine, bromine, and chlorine.*—Considerable, though as I conceive unnecessary, importance has been given to the fact that cod-liver oil frequently or usually contains both iodine and bromine. To the presence of one or both of these substances has been ascribed the whole or part of the remedial efficacy of the oil. A little consideration, however, would be sufficient to prove that their therapeutical agency in the oil must, if any, be exceedingly small. The proportions in which they exist in the oil is inconstant, though in all cases very small. Moreover, beneficial effects have been produced by the use of the oil, which neither iodine nor bromine are capable of producing.

Some Chemists have failed to detect *iodine* in cod-liver oil. De Jongh says, that it is present in every genuine oil, but that the only certain mode of detecting it is to saponify the oil, and carbonize the resulting soap. He confirms Stein's remark, that neither by immediately carbonizing the oil, nor by saponifying it, and then decomposing the soap by acids, can the iodine be detected. It follows, therefore, that iodine exists in the oil neither in the free state nor in that of metallic iodide, but probably in organic combination—perhaps, as an iodic fatty acid. De Jongh determined the proportion of iodine by forming iodide of palladium; every 100 parts of anhydrous iodide of palladium was considered equivalent to 70.34 parts of free iodine.

The largest amount of iodine found in genuine oil is less than 0.05 per cent. If the amount obtained be larger than this, fraud may be suspected. It is said by Dr. Martiny* that some dishonest Druggists have introduced iodine into the oil for the purpose of augmenting its commercial value. Nay, it is stated that an artificial cod-liver oil has been made by combining iodine with common fish or train oils.

De Jongh detected *bromine* in the oil by Balard's process. The carbonized soap was digested with alcohol, and the alcoholic extract treated with chlorine gas and ether. Its proportion was estimated in conjunction with that of chlorine, as the quantity was too small to admit of accurate separation.

The *chlorine* was determined by precipitating it as chloride of silver from the watery extract of the carbonized soap.

6. *Phosphoric and sulphuric acids.—Phosphorus.*—De Jongh determined the presence and quantity of these ingredients in the following way: The oil was saponified by potash, and the soap thus obtained decomposed by hydrochloric acid, by which the fatty acids were separated. From the solution the phosphoric acid was precipitated by a

* *Naturgeschichte der für die Heilkunde wichtigen Thiere.* Darmstadt, 1847.

nitrate of iron (whose proportions of oxide was known) and ammonia, and the sulphuric acid by means of nitrate of baryta.

In order to determine the presence and quantity of free phosphorus or sulphur, a given quantity of oil was decomposed by concentrated nitric acid, and the quantity of phosphoric and sulphuric acids in the oxidized liquid ascertained by the above-mentioned method. More phosphoric acid was procured from the oxidized than from the unoxidized liquid, and the proportion of phosphorus was calculated from the excess of acid.

7. *Acetic and butyric acids.*—De Jongh separated these volatile acids from cod-liver oil by adding sulphuric acid to the soda-soap, and distilling the liquid thus obtained. The distilled product had a peculiar odour. It was saturated with barytic water, and evaporated to dryness. One portion of the residue was insoluble in alcohol, the other was soluble. The insoluble salt was acetate of baryta with two equivalents of water ($=C_4\ H_5\ O_5$, Ba O); the soluble salt was butyrate of baryta. The soluble salt obtained from the pale oil gave the formula 2 ($C_8\ H_6\ O_3$), Ba O, 6 HO; that procured from the pale brown sort gave the formula $C_8\ H_6\ O_3$, Ba O, HO.

Rancid cod-liver oil emits an odour like common fish, or train-oil, and we might, therefore, expect that phocenic acid would be a constituent of cod-liver oil. De Jongh did not detect it; but thinks that phocenic acid may perhaps be resolvable into acetic and butyric acids—a supposition somewhat improbable, seeing that phocenic acid contains considerably more carbon than either butyric or acetic acid. Berzelius observes, that the presence of acetic acid in cod-liver oil, in a form which is not extractable by water, is remarkable, because it leads to the supposition that it is contained in the form of a peculiar fat, which would be the acetate of lipule.

It will be unnecessary to enter into any details with respect to the other constituents of the oil.

The characters by which we judge of the genuiness, purity, and goodness of the oil are partly physical, partly chemical.

The physical characters which are usually employed are principally colour, odour, and flavour. The finest oil is that which is most devoid of colour, odour, and flavour. The oil as contained in the cells of the fresh liver is nearly colourless, and the brownish colour possessed by the ordinary cod-oil used by curriers is due to colouring matters derived from the decomposing hepatic tissues and fluids, or from the action of air on the oil. Chemical analysis lends no support to the opinion, at one time entertained, that the brown oil was superior, as a therapeutical agent, to the pale oil. Chemistry has not discovered any substances in the brown oil which could confer on it superior activity as a medicine. On the other hand, the disgusting odour and flavour, and nauseating qualities of the brown oil, preclude its repeated use. Moreover, there is reason to suspect that, if patients could conquer their aversion to it, its free use, like that of other rancid and empyreumatic fats, would disturb the digestive functions, and be attended with injurious effects.

Of the chemical characters which have been used to determine the genuineness of cod-liver oil, some have reference to the iodine, others to the gaduin or to the bile constituents. I have already stated that some fraudulent persons are said to have admixed iodine (either free

iodine or iodide of potassium) with train oil to imitate cod-liver oil. The presence of this substance may be readily detected by adding a solution of starch and a few drops of sulphuric acid, by which the blue iodide of starch is produced; or the suspected oil may be shaken with alcohol, which abstracts the iodine.

But though we may thus readily prove that the suspected oil contains no artificially added iodine, the iodine which is naturally contained in, and more intimately combined with the oil, may be frequently recognized by another process. Marchand * gives the following directions for detecting it: Saponify the oil with soda, carbonize the soap thus obtained, digest the coal in distilled water, add a drop of starch paste, and subject the mixture to the action of a voltaic battery, the positive pole being placed in contact with the starch paste, the negative pole with the solution. If iodine be present, the starch becomes blue. Marchand states that by this test, the iodine can be detected in the urine of a patient soon after he has taken the oil. This, however, is certainly not always correct, for I submitted the urine of a young gentleman, who, for several weeks had taken with great benefit a tablespoonful of cod-liver oil thrice daily, to the action of a galvanic battery of fifty pairs of plates for several hours, without obtaining the slightest evidence of the presence of iodine.

Sulphuric acid has been employed as a test for cod-liver oil. If a drop of concentrated sulphuric acid be added to fresh cod-liver oil, the latter assumes a fine violet colour, which soon passes into yellowish or brownish-red. Some samples of oil produce at once the red colour, without the preliminary violet tint. Gobley † who noticed this reaction in the case of oil of the liver of the ray, says, that oil which has been prepared by ebullition in water, does not possess this property, but yields with sulphuric acid a clear red colour. This, however, is an error, at least with respect to cod-liver oil. It has been erroneously supposed by some persons that this violet colour was due to the evolution of iodine by the action of the acid on an alkaline iodide contained in the oil. If that were the case, the presence of a little starch-paste would be sufficient to convert the violet into an intense blue colour; which is not the case. The colouration in fact depends on the action of the sulphuric acid on some one or more organic constituents of the oil, and the following facts lead me to infer that it is in part due to the presence in the oil of one of the constituents of the bile.

It is well known that in 1844, Pettenkofer ‡ pointed out a new test for bile. If to a liquid supposed to contain bile, about two-thirds of its volume of oil of vitriol be added, the liquid kept cool, a few drops of a solution of cane-sugar (four or five parts of water to one of sugar) be added, and the mixture shaken up, a violet red colour is produced, provided bile be present. This test succeeds very well, if we dissolve a little extract of ox-bile in water, and test the solution with sugar and oil of vitriol. The colour developed agrees with that produced by the

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* *Lebrbuch der Physiolog. Chemie.*

† *Journal de Pharmacie*, 3me sér., t. v., p. 308. 1844.

‡ *Ann. der Chemie und Pharmacie*, Bd. lii., s. 90, 1844; also Simon's *Chemistry*, translated by Dr. Day, vol. ii., p. 193.

addition of oil of vitriol to cod-liver oil, which De Jongh has shown, contains the essential constituents of the bile.

Pettenkofer remarks, that the presence of a very great excess of chlorides will change the violet-red colour into a brownish-red. This fact is deserving of notice, because it may aid in accounting for the fact that some specimens of cod-liver oil strike a brownish red, not a violet-red colour, with oil of vitriol.

Strecker § confirms Platner's observation that both cholic and paracholic acids produce the same colour with sugar and oil of vitriol, as bile does; so that Pettenkofer's test doubtless acts on one or both of these acids. Now De Jongh has shown that chloric acid is contained in cod-liver oil, and we have, therefore, good reason for believing that it is in part by the action of oil of vitriol on this acid, that the violet-red colour is produced in cod-liver oil.

But it is well known that for the development of this colour in bile it is necessary to use, besides oil of vitriol, a third agent (sugar). Pettenkofer observes that for cane-sugar we may substitute grape-sugar or starch; in fact, any substance which can by the action of oil of vitriol be converted into grape-sugar. No such substance has hitherto been detected in cod-liver oil, and, therefore, it may be said the necessary ingredient to produce this characteristic re-action of oil of vitriol on cholic acid is wanting. Strecker has recently supplied the wanting link. In his valuable paper on ox-bile, to which I have already referred, he observes that acetic acid may be substituted for sugar. To the liquid supposed to contain bile add a few drops of acetic acid, and then concentrated sulphuric acid, when a magnificent purple-red colour is developed. If the quantity of bile be small, it may be necessary to use heat. Now, as cod-liver oil contains acetic acid, we have the requisite agent to enable the oil of vitriol to act on the cholic acid, and the development of the purple or violet-red colour is then readily accounted for.

I have already noticed the red colour produced by the action of oil of vitriol on gaduin (supposed by Berzelius to be derived from the bile). Here then is another source for the red colour caused by the action of sulphuric acid on cod-liver oil.

It follows, therefore, from what has been now stated, that oil of vitriol is a test for liver oils. It does not distinguish one liver oil from another, for it re-acts equally with the oil of the liver of the ray and with oil of the liver of the common cod. Neither does it distinguish good cod-liver oil from bad, for it produces its characteristic re-action both with common brown cod-oil, and with the finest and palest qualities. But it serves to distinguish oil procured from the liver, from oil obtained from other parts of the animal.

THE PROGRESS OF THE SCIENCE OF BOTANY.

We have made arrangements with a gentleman, from whom we have already received several contributions, to present our readers occasionally with a short paper upon some branch of Botany, in order to represent to them the present state and

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§ *Ann. der Chemie und Pharmacie*, Bd. lxv., s. 15, 1848.

progress of that science. This science has increased to so great an extent within the last few years, that books published but a short time since, have become comparatively useless. It is true that we have some good works but recently published upon Botany, and we have also several periodicals devoted exclusively to the natural history sciences, but to the Pharmaceutist, whose time is so valuable, we believe we shall be conferring a real benefit by representing to him, as far as we are able, in a few short papers, the present state of certain branches of this science.

ON THE DISTINCTIONS BETWEEN ANIMALS AND PLANTS.

BY ROBERT BENTLEY, ESQ., F.L.S.,
Lecturer on Botany at the London Hospital.

If we compare together the higher tribes of the animal and vegetable kingdoms, we shall find no difficulty in forming a distinct idea as to which kingdom of nature they respectively belong. Thus, no one would feel any uncertainty as to the characteristics proper to a forest tree or a quadruped, but as we gradually descend to the lower tribes of the two kingdoms, we find the distinctive characters becoming gradually fainter and fainter, until we arrive at last at a simple cell, which appears to extend upon the confines of the two kingdoms, and to partake of the characters of both, and might with equal justice be referred to either. Indeed, there are not wanting physiologists of the highest ability, as Kützsung, Unger, and many others, who believe that there are natural bodies which are vegetables at one period of their lives, and animals at the other. They positively assert this to be the case in some of the lower *algæ*, as *Ulothrix zonata*, *Vaucheria clavata*, &c.

Linnæus has said, that vegetables grow and live, but animals grow, live, and feel, and this definition is nearly in accordance with the generally received opinion upon the subject, for animals are commonly regarded as beings which live, grow, and reproduce themselves, agreeing in these characters with plants; but they also possess the powers of voluntary motion, and consciousness of external impressions, characters which we usually consider plants not to possess, but we cannot deny the power of locomotion to many tribes of plants, as the *Diatomaceæ*, and there are numerous plants which move with as much appearance of consciousness as many of the lower animals; for example, compare the movements of the *Oscillatoreæ*, and the reproductive particles of some of the lower aquatic tribes of plants, with the movements of many *polypes*, and the lower *mollusca*. Again, there are large tribes

usually considered as belonging to the animal kingdom, and of which we may take the sponge as an example, which, as far as we have ascertained at present by observation and experiment, possess neither sensation nor power of voluntary motion.

Another character commonly regarded as distinctive of animal life is the presence of a stomach; but strictly speaking we might consider a plant as composed of many stomachs, for every vegetable cell, of which it is composed, is physiologically a stomach. In animals, however, the stomach is not a closed one as a vegetable cell, but it is open to the external medium, and food is thus introduced into its exterior, consequently, absorption of nutriment takes place from within; whereas, in plants, absorption of nutriment takes place from without, into a cavity, which is a closed one.

The respiratory process also affords a character, by which animals are considered by some physiologists as distinguished from plants; for, in the respiration of animals, oxygen is absorbed, and carbonic acid evolved, whereas, in what has usually been considered the respiration of plants, we have a fixation of carbon and evolution of oxygen. But this process occurs only in plants exposed to sun-light, and seems rather to be analogous to the digestion in animals, and we believe the true functions of respiration in plants to consist as in animals, of an absorption of oxygen and evolution of carbonic acid, and this process we know takes place both by night and day in plants.

Generally speaking, animal structures are quaternary compounds, consisting of carbon, oxygen, hydrogen, and nitrogen; whereas vegetable structures are usually ternary compounds, being composed of carbon, oxygen, and hydrogen; but there are many instances of plants possessing nitrogen, as a component part of their structure, as, for instance, the *cruciferæ* and *fungi*.

Another distinctive character between animals and plants is derived from the nature of their food. The food of plants, consisting of elements derived from the inorganic kingdom, which they convert into certain organic compounds, while the food of animals is derived from the organic kingdom. Animals not possessing the power of converting inorganic materials into the substance of their tissues, hence they are dependent upon plants for their means of support; and here we may notice the beautiful provision of nature by which one kingdom is made subservient to the uses of the other.

We see, therefore, that in the present state of science, we cannot draw a distinct line of demarcation between the two kingdoms. Numerous tables of supposed distinctive characters have been drawn up, of which the following has been given by Dumas :—

PLANTS.	ANIMALS.
Produce indifferent substances containing nitrogen ;	Consume indifferent substances containing nitrogen ;
——— fats ;	——— fats ;
——— several varieties of sugar, starch, and gum.	——— sugar, starch, and gum.
Decompose carbonic acid ;	Produce carbonic acid ;
——— water ;	——— water ;
——— ammoniacal salts.	——— ammoniacal salts.
Give off oxygen.	Absorb oxygen.
Absorb warmth ;	Produce warmth ;
——— electricity.	——— electricity.
Are apparatus of reduction.	Are apparatus of oxidation.
Are immoveable.	Change their place.

We have already shown that several of these characters will not bear the test of examination, and we might also proceed to point out many exceptions to all the remainder, but sufficient has been already stated to prove, that, in estimating the distinctions between the two kingdoms, we must be satisfied with characters taken from entire kingdoms, rather than from individuals, and then we shall find, that the characters we have mentioned above, will be found generally applicable.

Finally, It would seem, from recent investigations, that we do, however, possess one absolute distinctive character between the two kingdoms, and that this consists in the power which plants possess of secreting starch, for at present starch is unknown in the animal kingdom. Hence, should future experiments confirm this fact (and there appears no reason to doubt it) we shall be readily able to ascertain the vegetable or animal nature of any doubtful body ; and by this test, namely, the presence of starch in their interior, the nature of the true corellines, and a number of other doubtful bodies have been already ascertained, and found to belong to the vegetable kingdom.

ON THE CHEMICAL COMBINATIONS INDUCED IN GASEOUS MIXTURES BY CONTACT WITH CERTAIN METALS ;

With Especial Reference to the Action of Spongy Platinum on Mixtures of Oxygen and Hydrogen.

BY JAMES FIELD, ESQ.

The remarkable action of certain metals on gaseous mixtures, especially that of platinum, on mixtures of oxygen and hydrogen, is too familiar to require detail ; but, although this phenomenon has been known in the scientific world since the year 1824, the subject, though teeming with interest, appears to have been but scantily investigated, and philosophers, generally, have been content to receive, and adopt a theory for its explanation, of a nature too unsatisfactory to allow of its being considered in any other light than as an ingenious method of waiving a philosophical difficulty.

Having lately been engaged in some voltaic researches, my attention was drawn to this subject by certain facts which appeared entirely at variance with the theory, and being unable, after repeated endeavours to reconcile the two, I was induced to refer the phenomenon to some other cause, and ultimately arrived at a means of explanation much more in consonance with our present knowledge, and without the necessity of any extraordinary hypothesis.

The theory which has been so long acknowledged, is chiefly based on the assumed possession by certain bodies of a condensing power, the existence of which however, is incapable of demonstration, and the probability of which I shall presently discuss.

The attraction by which most solid bodies become wetted when placed in contact with certain liquids, is well known to us all, and gases, which are only more mobile fluids, manifest the same property, the cohesion in both cases being alike as to cause, and closely approximating in effect. Now, Delaroche has shown, that when a mixture of O and H gases in their most explosive proportions is subjected to a pressure of 540 metres of water, equal to fifty atmospheres, no combination ensues; and although this is not the extent to which such compression may be carried without resulting in chemical union, it is quite sufficient to indicate the fallacy of attributing the condensation of the gases to the above comparatively powerless attraction, and, therefore, if we allow the phenomenon to be a result of condensation at all, it becomes necessary to consider such condensation in the light of a new and independent power, by virtue of which a single square inch of such metallic surfaces, is capable of exerting a force exceeding 700lbs. I have before stated that this assumption as a metallic property still remains unproved, and perhaps at first this may seem at variance with experiment, since Dobereiner has shown that spongy platinum is capable of condensing oxygen into its pores to an enormous extent. But if this were an inherent property, we should be able to demonstrate its presence as well under the *massive* as the *porous* form We have not, however, the slightest proof of its existence in any but the spongy state, and its absence in every other, must clearly indicate that this power is not an attribute of the *metal*, but only of the *form* under which the metal exists, or in other words, is simply a result of capillary attraction. That this attraction is fully competent to produce the effect cannot be doubted, since its immense power has been amply exhibited in severing large masses for the manufacture of millstones; and Hutton, who has calculated the amount of force thus rendered available, states that a single square inch of wood when used as a wedge for the above purpose, is able, under the influence of moisture, to exert an effort of 21,875 pounds.

Having thus shown that the only condensing power proved to exist is merely a consequence of capillary attraction, and depends entirely on the porous state of the metal, it is evident that we must cease to consider the phenomenon an effect of condensation at all, for as smooth metallic surfaces (where capillary attraction is out of the question) are also efficient, the presence of this force is not indispensable, and it becomes necessary to seek the solution of this problem in some other cause.

The peculiar electrical relations of platinum suggested to me the possibility that this phenomenon might be of voltaic origin, and on

going farther, and perceiving that the more the other metals approximated in these characters to platinum, the more nearly did their action resemble the energy of that body, little more was necessary to convince me of its being so. When a plate of platinum is placed in contact with the mixed gases, a voltaic current is immediately produced, and the hydrogen becomes gradually oxidised. If a *thick* plate be used, the chemical action is exceedingly slow, because the combination is dependent entirely on the electrical current; but if in lieu of a *plate*, we take the metal in a *finely divided* form such as it exists in the platinum sponge, not only is the voltaic action as before brought into play, but a new force operates which accelerates the combination to the remarkable extent observable as a characteristic of attenuation.

All electricians are aware that platinum as a metal possesses but very inferior conducting powers, and that a single voltaic cell, of small dimensions, is capable of eliminating sufficient electricity to heat a platinum wire red, or even white hot—the degree of heat, and amount of electrical fluid required to produce such effect, being in proportion to the thickness of the wire. The case, however with the other metals is somewhat different, for although they may be heated like platinum, the amount of electricity required to produce the same result is far greater, and the difference in this respect is strikingly shown by making a chain, composed of alternate links of platinum and some other metal the medium for conveying such a current, when the links of the former will be heated to redness, whilst the latter remain unaffected.

From these observations it is easy to perceive that a voltaic current too weak to raise the temperature of a plate of *gold*, might nevertheless heat a *platinum* plate of equal size to redness; and again that another current, too much deficient in power to influence a *plate* of platinum, might exert its full calorific influence on the same metal under the comminated form of sponge. Accordingly we find that when instead of a plate, the metal in the state just mentioned is used, the action is instantaneous, an electrical current is set in motion, which, in traversing the metallic lamina, heats the platinum to redness, and as in contact with a body at such a temperature, the combination can no longer proceed gradually, direct combustion, and in close vessels explosion, results. Professor Grove has shown that where a series of cells, containing the two gases and a platinum plate, are connected in the ordinary way, a battery of considerable power may be obtained; but although for the direct cognizance of the electricity thus set in motion, an arrangement at least similar to the ordinary form must be employed, for the mere establishment of a voltaic circuit, this is by no means necessary. A very simple experiment is sufficient to prove this, for if we plunge a mass of pure zinc into dilute sulphuric acid, no chemical action ensues, and the zinc would remain uninjured for an indefinite period: but if for the *pure* zinc we substitute the *ordinary metal*, the immersion is immediately accompanied by its oxidisement, and subsequent solution in the acid. This result, which is termed local action, originates in an impurity, which, by becoming equivalent to the negative plate of an ordinary battery, permits the establishment of a voltaic circuit, the electricity of which must find passage, before the chemical affinities can exert their influence. Here then we have a battery, the elements of which are promiscuously intermixed, and

although simply from the absence of arrangement we are unable to exhibit the current directly, through the medium of its action on a galvanometer, or other means independent of the battery, the experiment above quoted proves the existence of such a current, since the chemical action was unable to proceed without it. The case of the platinum in the mixed gases is precisely analogous, constituting a battery upon the same principle. Like that I have just described, it is incompetent to display the electricity otherwise than through the medium of its chemical effects; but whilst we are *certain* that the combination of the zinc and oxygen in the former case was entirely dependent on the voltaic circuit, so can we with equal reason assume the oxidisement of the hydrogen in the latter to result from the same cause. Again, whilst platinum and one or two other metals closely allied to it, are effective at ordinary temperatures, gold and silver amongst others appear not to be so, but require heating to 212°. Now, if the phenomenon depended upon the condensing powers of metallic, bodies, how is it that raising the temperature augments the action? for, although it is true that such calorific increase disposes the gases to unite under less pressure, still, we must be quite aware that every degree of heat thus added will increase so considerably the natural repulsion of the gaseous particles, as at 212° entirely to destroy, or at least very materially lessen the supposed condensing powers of the metals. On the other hand, the application of heat not only presents no objection, but is in every way favourable to the voltaic theory, for whilst the increased temperature is conducive to the more ready union of the gases, the energy of the battery is from the same cause vastly augmented.

I would here remark, that I do not of course attribute the whole amount of caloric set free entirely to the passage of electricity, since the chemical union of the gases, when once commenced, must also assist in this respect. Nor will I deny that the capillary condensation exerted when the metal is in the spongy form, materially adds to the rapidity of the combination. I only affirm electricity to be the primary cause, and consider the others as no more than secondary agencies.

I have now stated my theory. Viewing it as correct, we are no longer compelled to create imaginary forces, since those properties which we know to exist are amply sufficient to account for the extraordinary action which forms the subject of my paper.

As far as I am acquainted, it is in every way consistent with our present knowledge, and although future experiments may indicate the necessity of some slight modification, I cannot think that electricity, and the cause of this phenomenon, can ever prove otherwise than synonymous.

ON EXPLOSIONS IN CHEMICAL LABORATORIES.

BY DR. A. BUCHNER.

The occurrence of explosions in pharmaceutical laboratories, is usually the consequence of some neglect in the process of distillation; thus in rectifying ether, the most frequent causes of explosions are air-tight closure of the apparatus, the employment of too high a heat, insufficient refrigeration of the receiver, or the escape of ether vapour, which

mingling with atmospheric air, forms an explosive mixture, which becomes ignited by some burning body.

Likewise in the distillation and preservation of other very volatile and combustible liquids, such as spirit of wine, the various kinds of ether and volatile oils, similar accidents have happened from like causes.

In a pharmaceutical laboratory in Saxony, the operator, in rectifying turpentine by means of a copper still, had forgotten to pour water into the still. A short time after the fire had been lighted, a violent noise was heard in the still, and whilst the operator was endeavouring to ascertain the cause of it, the still-head was blown off with a loud report, and the escape of the greater part of the oil, by which the operator and two other persons were much scalded. In this case, the receiver had been probably fixed air-tight to the refrigerating tube.

A similar accident happened in another laboratory : a strong flaming fire had been applied under the still, and the operator left the place for a few moments. In a very short time the whole laboratory was enveloped in flames ; the vapour of the oil of turpentine had been formed more rapidly than it had been condensed ; an escape in consequence took place, and the unconfined vapour became ignited by the fire under the still.

In another pharmaceutical establishment in Saxony, an explosion was caused by pouring naphtha from one vessel into another. The naphtha was kept in a cellar, in a large tin bottle; but this being at the time of the accident, only about a quarter full, its contents were poured into a smaller bottle, in the immediate vicinity of which was a burning candle. The oil ignited with such a violent explosion, that the tin-bottle burst, and the burning naphtha was thrown about the place. In this case, probably, the cellar had not been kept sufficiently cool, or the burning candle had been standing for some time close to the tin-bottle, so that the vapour of the volatile oil mixing with the atmospheric air contained in the bottle, formed an explosive mixture. A case is known where a spirit of wine cask which was not quite empty, and which had been for some time exposed to the sun on a hot summer's day, had an explosive mixture formed within it, and which took fire on the approach of a candle.

Before the introduction of Woulfe's apparatus into pharmaceutical laboratories, explosions during distillations were of more frequent occurrence than at present. In distilling *liquor ammoniæ*, two accidents are known to have occurred, by one of which the operator lost the sight of both his eyes. Another happened in distilling concentrated acetic acid, in consequence of the junction of the receiver with the retort having been made air-tight by a bladder, and the receiver not kept sufficiently cool.

A violent explosion once took place in a pharmaceutical laboratory, when some organic substance was subjected in a retort to decomposition and distillation with nitric acid. In order to explain the phenomenon, it is only necessary to call to mind the properties of xyloidin and of gun-cotton.

In the laboratory of Professor Trommsdorff, four dangerous explosions took place in the course of a few years. The one happened with the purple of Cassius. The precipitate of gold had been collected on a small filter, washed, and placed on a stand near the heated parlour-stove, where it remained for some weeks. Mr. Trommsdorff then introduced the precipitate into a small glass-bottle, and was closing it with a glass-stopper, when the bottle was blown to atoms in his hand. This explosion may be explained by the circumstance, that close to the purple precipitate several other preparations had been dried and preserved, by which probably ammoniacal gas had been developed, so that gradually fulminating gold was formed.

The second explosion was caused by detonating silver, of which about two drachms had been prepared, and after drying taken from the filter and

placed on a sheet of glazed paper, with the intention of introducing it from the latter into a bottle; it had been removed with the greatest care from the filter, so that nothing could adhere to the paper. In order to see whether the filter would detonate, Mr. Trommsdorff threw it into a wind-furnace, which contained red-hot coals, and stood about four or five paces from the table on which the detonating silver was lying. Unfortunately, the detonation in the furnace was so violent, and caused so strong a vibration of the air, that the silver on the table simultaneously exploded, and caused considerable damage. The experimenters remained for some time quite deaf, and the explosion caused great alarm throughout the whole town.

The fatal accident which happened in 1842, at Apothecaries' Hall, London, and by which the much-lamented operator, Mr. Hennel, lost his life, must be yet fresh in the memory of our readers.

On another occasion, some melted copper was poured into a crucible, when immediately the fused metal was thrown up with great violence over the heads of the bystanders to the ceiling. The operator had cleansed the crucible, but not sufficiently wiped it, so that probably a few drops of water might have remained at the bottom, and these were converted into steam as soon as the glowing metal came in contact with them.

The fourth and more violent explosion occurred during the distillation of phosphorus, in consequence of an incautious experiment. When the development of the combustible gas and the distillation were in full operation, Mr. Trommsdorff was about showing to his pupils that the gas was combustible; for this purpose, he approached a lighted match to the receiver, which contained water, but at the same moment the iron cupola, with which the furnace was covered, together with the fire pipe, were blown off with a loud report, and much damage was done to the apparatus. The probable cause of this explosion, was, that over the surface of the water in the receiver, atmospheric air was contained, which had mixed with the phosphuretted hydrogen, and formed an explosive mixture.

That very fatal explosions often take place in operations with nitre, is well known, and easily explained; but only one case has occurred in a pharmaceutical laboratory. A pharmaceutist had to make *Antimonium diaphoreticum*, and for this purpose put a crucible in a furnace, between red-hot coals, and then gradually introduced a mixture of powdered sulphuret of antimony and nitre, without waiting for the deflagration, which did not immediately occur, as the crucible had not become hot. When all the powder had been introduced, an explosion took place, by which he was dreadfully wounded.

Chlorate of potash is far more dangerous than nitre. The accident which happened in 1817, in Munich, in consequence of the incautious treatment of a mixture of chlorate of potash, sulphur, sugar, and cinnabar for lucifer matches, will be remembered by many (*Repert. für der Pharm.*, iii, 119—126). In fusing chlorate of potash for the evolution of oxygen and the production of perchlorate of potash, the greatest care is required to prevent any combustible matter coming in contact with it. This is proved by the following case. An apothecary, intending to develope oxygen from chlorate of potash, employed a tubulated retort, the tubulure of which was closed with a cork. When the salt had fused and gas was escaping, an explosion took place, which fortunately did not injure the experimenter. It is probable that a piece of the cork, which had begun to be charred, had fallen into the fused salt.

Explosions in experiments with Marsh's apparatus, when the jet of gas is ignited before all the atmospheric air is expelled, have also occurred. It is necessary to observe, that on all occasions, when it is intended to ignite the evolved hydrogen gas, care must be taken to allow sufficient time to elapse for all the atmospheric air to be expelled from the apparatus, or at least that so little may be left, that the mixture be incapable of exploding.

Explosions in operations with cyanide of potassium and ferridcyanide of potassium are rare, and the following, therefore, are worthy of notice:—A Chemist had prepared cyanide of potassium by Liebig's method, but as the latter portions of it were blueish grey, and showed several spots containing iron, he attempted to purify a small portion by fusion. A violent explosion ensued, and the crucible was blown to atoms. The contents of the crucible were so entirely scattered, that the collected residue did not suffice to discover by a chemical examination, the cause of this unexpected phenomenon.

Dr. Elsner has described the following explosion, that occurred in preparing ferridcyanide of potassium. Chlorine gas had been passed into a rather large quantity of an aqueous solution of the ferrocyanide of potassium. The gas was developed from common salt, sulphuric acid, and the oxide of manganese, in cast-iron vessels. In the course of the operation it was discovered that after some time a large quantity of muriatic acid was developed, in consequence of which the mixture was set aside and replaced by a fresh one. In the vessels in which the gas had been developed a brownish red, hard, stone-like mass was contained. This, upon examination, was found to contain chloride of iron and some undecomposed oxide of manganese, which, as it appears, had escaped the action of the muriatic acid. Chlorine gas having again been passed for several hours from the fresh mixture into the solution of ferrocyanide, the latter was left standing in a wooden tub. Suddenly, and without perceptible external cause, a violent explosion took place in the premises where the operation had been performed, the whole building shook, and the windows and doors were partly torn off their hinges. The wooden tub, which contained the solution of ferrocyanide of potassium, and whose staves were an inch thick, was blown to pieces and parts of it thrown up the chimney.

The cause of this remarkable explosion, was undoubtedly the formation and decomposition of chloride of nitrogen. By the action of the free hydrochloric acid on the ferrocyanide of potassium, it is probable that cyanuretted hydrogen and some ammonia, and consequently sal ammoniac, had been developed. Now it is well known, that by the action of chlorine on sal ammoniac, there is formed chloride of nitrogen, which explodes with great violence when it is brought in contact with certain organic substances. Döbreiner long ago mentioned that chloride of nitrogen was formed when chlorine gas was conveyed into a solution of the ammoniacal chloride of zinc.—*Buchner's Repertorium.*

THE GUM-KINO OF THE TENASSERIM PROVINCES.

BY THE REV. F. MASON.

In a valuable article* by Dr. Royle on gum-kino, reprinted in the *Journal of the Agricultural and Horticultural Society of India*, which ostensibly enumerates all the various regions from which it has been imported into England, there is no mention of this article being imported from this coast; yet long before Dr. Royle compiled that communication, more than one consignment had been made by parties in Maulmain to houses in London of gum-kino to the amount of a thousand pounds.

It was brought to Maulmain by an English merchant from the Shan States, and stated by him, as our Commissioner at the time informed the writer, to be the production of the *Pa-douk*, the same tree as the one in Maulmain thus denominated by the Burmans. Several years before I had directed attention to this tree as producing an astringent gum resembling

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* Dr. Royle's paper was read at the meeting of the Pharmaceutical Society of Great Britain, on April 8th, 1846, and was published in the *Pharmaceutical Journal*, vol. v., page 495. 1846.—Ed. Pharm. Journ.

gum-kino; but the medical officer to whom I submitted specimens of the gum, said it was "a kind of dragon's blood;" but after it was known that the gum of the *Pa-douk* had been sold in London for the veritable gum-kino, another medical gentleman tried in his practice the exudation of the tree in his compound in the place of the gum-kino in his stores, and reported the effects the same—that their medical virtues were alike.

The next enquiry that arises is for the genus and species of the *Pa-douk*. When I first came to the coast all the English residents of my acquaintance called it "Burman Senna," and the surgeon of the station told me that he believed it was a species of senna. The Rev. H. Malcom, D.D., President of Georgetown College, Kentucky, who came out to India a dozen years ago in order to go back again and write a book, has stereotyped in his travels, "Pa-douk, or mahogany (*Swietenia Mahogani*) is plenty in the Upper Provinces, especially round Ava, found occasionally in Pegu." In a native Pali dictionary found in the Burmese monasteries, Pa-douk stands as the definition of *Pe-ta-thá-lá*, and the corresponding Sanscrit word in Wilson's Dictionary is defined *Pentaptera*; but the Pa-douk does not belong to that genus. In Piddington's Index, however, *Peetshala* stands as the Hindu name; and in Voigt's catalogue, *Peetsal* as the Bengalee name of *Pterocarpus marsupium;* and this brings us nearer the truth, for Pa-douk is a name common to two different species of *Pterocarpus*, but which look so much alike that they are usually regarded as one species. Undoubtedly one species is *P. Indicus*, and the other, I presume, is the one named by Wight *P. Wallichii*, but which was marked in Wallich's Catalogue *P. Dalbergioides*, from which it differs in no well-marked character, excepting that the racemes are axillary and simple, while in that they are terminal and "much branched." Wight says of *P. Wallichii* in his *Prodromus*, "Stamens all united, or split down on the upper side only;" so they are sometimes in our tree. In the figure that he gives in his illustrations they are represented as diadelphous, nine and one, and so they are seen occasionally in our tree; but the more common form is that of being split down the middle into two equal parts of five each, as in *P. Dalbergioides*. The wood too resembles it, "Not unlike mahogany, but rather redder, heavier, and coarser in the grain." It is often called "red-wood" at Maulmain, and from the colour of the wood some of the natives distinguish the species "Red Pa-douk," being *P. Dalbergioides*, and "White Pa-douk," *P. Indicus*.

Both these trees produce an astringent gum, which has been exported for gum-kino, or whether it was a mixture of both it is not possible to say. Probably the latter, as the native collectors would not probably make any distinction. Possibly it is the production of neither: it may be that *P. marsupium* is found in the Shan States, for it grows, I believe, in Assam, and the man that did not distinguish the two species in Maulmain would not distinguish them from a third at Zimmay. Be that as it may, this is certain, that these provinces can furnish the commercial world with a large quantity of gum-kino. If the result of the experiment which was made be correct, we have a great abundance of it within our own borders, for the Pa-douk is one of the most common forest trees in the provinces from the Tenasserim to the Salwan. It furnishes a considerable portion of the fuel that is sold in Maulmain; but if not it is certainly abundant in the neighbouring provinces, whose only avenue to market is through our territories.

To enable the Members of the Society to detect any errors into which I may have fallen, accompanying this paper are three packages, *viz.*

No. 1. A flowering branch and young fruit of *P. Wallichii*.

No. 2. A flowering branch of *P. Indicus*.

No. 3. A specimen of the gum-kino brought from the Shan States and exported from Maulmain.—*From the Journal of the Asiatic Society of Bengal, for August*, 1848, *New Series, No.* 21, p. 223.

ON LIQUID PROTOXIDE OF NITROGEN.

BY M. DUMAS.

M. NATTERER, of Vienna, has constructed a forcing-pump for the liquefaction of gases, by means of which carbonic acid and protoxide of nitrogen can readily be obtained in the liquid state. Having procured one of these instruments, and employed it more especially for the liquefaction of the protoxide of nitrogen, I soon perceived the necessity of using a series of indispensable precautions, but which, once adopted, have enabled me to effect with promptitude and security, as well as economy, the liquefaction of large quantities of protoxide of nitrogen.

As this liquid furnishes the means of producing an excessively low temperature, and is very easily applied, I will here briefly point out the observations I have made. The first relates to the principal piece of the apparatus, that is to say, the reservoir. In my opinion, the Viennese manufacturer has not given it sufficient strength. I have had it surrounded with a belt of forged iron, capable of resisting 800 atmospheres, and very nicely made by M. Bianchi. Moreover, I arranged things so that the reservoir being surrounded by ice, the body of the pump was cooled uninterruptedly by a circulation of water around it, and that even the stem of the piston was always moistened by cold water ; in this manner, there is no danger of the valve of the piston being injured by the heat proceeding from the compressed gas, and by its special action as a combustible gas. With these precautions, we may compress into the reservoir in the course of two hours, 200 litres (44 gallons) of gas, of which 20 suffice to produce a pressure of 30 atmospheres, about which liquefaction commences. The remainder of the gas furnishes a liquid ; 100 litres (22 gallons) yield 200 grms., (about ℥vj) or very nearly. The gas should be absolutely dry in order to succeed, and likewise as pure as possible. I prepare it from the nitrate of ammonia as usual, and after having dried it, pass it into air-tight bags; a couple of pounds of nitrate of ammonia suffices.

Once compressed, the liquid gas may be preserved for one or two days at least in the reservoir ; the valve however, is slightly injured by it. When the stop-cock of the reservoir is opened, the gas escapes ; a portion freezes at first, but it then flows liquid. The solid portion resembles a mass of snow; it melts upon the hand, and rapidly evaporates, leaving a severe burn. The liquid portion, which is by far the most abundant, and of which it is easy to obtain in one operation 40 to 50 grms. (℥iss), being received in a glass, keeps for half an hour, or even more, in the air.

In order to observe more readily its properties, I collected it in open tubes, contained in vessels at the bottom of which was placed some pumice-stone moistened with sulphuric acid. It then retains its transparency for a very long time.

The protoxide of nitrogen is liquid, colourless, very mobile and perfectly transparent ; each drop that falls upon the skin produces a very painful burn. The gas, which is incessantly liberated by a slow ebullition, possesses all the properties of the protoxide of nitrogen. When metals are dropped into this liquid, they produce a noise like that of red-hot iron immersed in water. Quicksilver causes the same noise, instantly freezes, and affords a hard brittle mass, white, like silver, which it perfectly resembles in appearance. Potassium floats upon the liquid, and experiences no change ; the same is the case with charcoal, sulphur, phosphorus, and iodine. Ignited charcoal floats upon the surface of the liquid, and burns with considerable brilliancy, and frequently until the whole is consumed. Ordinary sulphuric acid and concentrated nitric acid freeze immediately. Ether and alcohol mix with the liquid without freezing. Water is instantly converted into ice ; but it produces such a sudden evaporation of a portion of the liquid, that it causes suddenly a kind of explosion, which would be dangerous if merely a few grammes of water were poured at once into the liquid.—*Journal de Pharmacie*, Dec. 1848.

STAITE'S PATENT ELECTRIC LIGHT.

[Patent dated July 13, 1847; specification enrolled July 13, 1848.]

Firstly, My improvements in the construction of galvanic batteries consist in making them on what I call the "perfluent" system of supply and discharge, to contradistinguish it from the "percolating" system, which has recently come into extensive use. According to the percolating system, the liquid employed (usually sulphuric acid) is supplied to and discharged from each of the cells of the battery, in separate and distinct streams or series of drops; the liquid, as it becomes exhausted, though not entirely so, dropping out through an orifice in the bottom of the cell, and being then allowed to run to waste, and the place of the discharged liquid being supplied by fresh drops descending from above into each cell. But, according to the new system, to which I have given the name of "perfluent," the liquid is supplied in one stream only, which passes continuously through the entire series of cells, entering by the first cell of the series, and passing off through the last. The great loss attending the imperfect exhaustion of the portions of liquid discharged from each cell, is thus avoided; for the liquid, flowing in one stream through the whole of the cells one after the other, becomes completely exhausted, or as nearly so as may be, before its final discharge from the last of the cells. In ordinary galvanic batteries, when a perforation is made in the partition between any two of the cells, so that they may communicate transversely with one another, a considerable diminution of electric intensity is known to be the result; but no such diminution is observed to take place in the perfluent battery, from bringing the cells into communication with one another, owing to the circuitous course which the fluid is made to take between cell and cell. In proportion, of course, as the duration of the transit through each cell is shortened, the chance must be proportionally lessened of each portion of the liquid coming into contact with the acting metal or element in that cell; yet, as no drop of the fresh liquid supplied to the battery can make its way to the final discharge outlet without going through the whole of the cells, what it misses in the first cell, it is sure to encounter in one or other of the remaining cells. The cells last in order of a perfluent battery necessarily act less powerfully than the earlier cells of the series; as, for example, the last six cells of a series as compared with the first six. The diminution of power, that is to say, the quantity of electricity which the cells are capable of circulating, does not appear, however, to follow exactly in the ratio of the strength of the exciting liquids; for the difference in power between the middle and initial cells of a series is proportionally not so great as the difference between the middle and the terminal cells. When it is desirable to obtain intensity in the electric current rather than great quantity, the terminal cells should be made about equal to the quantitative power of the others, by uniting the similar conducting wires of several cells together, and using them as if proceeding from one cell. Thus, as it would be technically expressed, the last three cells in a fifteen cell battery (say the 15th, 14th, and 13th), might be connected for quantity, and the two next preceding pairs (say the 12th and 11th, and 10th and 9th) be connected also for quantity, and the first eight cells might be worked singly, in the usual manner of a series. But, however great may be the differences in power between the initial, middle, and terminal cells of a series, I find that in each cell regarded by itself apart from the others, the degree of exhaustion, and, consequently of electric action, is always very nearly uniform throughout every part of the cell. In consequence, moreover, of the liquid being in a state of continuous flow, and never acting on any one part of the cells more than another, the zinc or other metal employed wears much more

evenly than in the percolating battery, or any other with which I am acquainted.

The arrangement just described, is however, chiefly suitable for those batteries which use but one sort of exciting liquid, but in batteries where two fluids are used, as those of Daniel, Groves, and Callan, it may be expedient to adopt a modification of the perfluent system.

Secondly, My invention consists of certain improved modes of regulating the supply and discharge of the liquids employed in galvanic batteries.

Thirdly, My invention consists in attaching to all galvanic batteries in which a gradual change of liquid is required, an equilibrated hydraulic cistern and graduated meter.

Fourthly, My invention consists in the employment in galvanic batteries, having copper or mercury for the negative element, of a liquid amalgam of zinc and mercury enclosed in a bag or case of lawn or horse-hair cloth, or any other finely reticulated fabric, but not made of metal, which allows of the acid passing freely through its meshes to act on the bottom and sides of the zinc amalgam, while the bag or case retains the amalgam itself. I am aware that a liquid amalgam of zinc and mercury has been before used in place of an amalgamated surface of solid zinc, but to the best of my knowledge, never in the way now proposed.

Fifthly, My invention consists in the substitution in galvanic batteries, of solid plates made of an amalgam of zinc and mercury in the proportion of five parts of the former, to one part of the latter, for the zinc plates ordinarily employed.

Sixthly, My invention consists in the employment of lead as the positive element in galvanic batteries (instead of the zinc which is now commonly used), combined with a solution of nitric acid or of acetic acid, in some one or other of the forms best calculated to act on the lead. The best negative element in this case would be a surface of platinum, but most of the other negative elements which have been hitherto used, may be also employed with the lead.

Seventhly, My invention consists of an improved galvanometer, which is to be attached to the battery, in order to indicate to the eye the exact amount of galvanic electricity which is being circulated at any particular moment. The galvanometers usually employed for measuring the quantity of an electric current, are incapable of being used while the battery is applied to perform its work, nor can they indicate the amount of action or electricity circulating while such work is being performed, and these, with several other defects—such as their indications or degrees varying in a different ratio to that of the quantity of electricity passing—cause such galvanometers to be useless for most practical purposes. My new galvanometer is such that it can be made a permanent adjunct to, or part of the battery, so as to be always indicating what amount of electricity is circulating, when any sort of duty is being performed by it, and the weights of materials combining or used per minute at any particular time. The importance of these improvements may be measured by this consideration, that the cost of working a battery depends but little on the size of its elements, and varies precisely according to the rate at which its electricity is used by any particular work which it is set to perform.

Eighthly, My invention consists in the formation of magnets in manner following : The best Swedish charcoal iron is to be "converted," not in the ordinary manner, but only by a slight carbonization, or what is technically termed carbonizing it "just steel through." The blistered product is then melted and cast, and the ingot resulting from the process is rolled out into thick sheet metal.

Ninthly, My invention consists in the following improved mode of hardening magnets previous to magnetizing them. Instead of heating

them as usual in an ordinary furnace or sand-bath, I heat them in a bath of melted metal raised to a red heat (using by preference lead) first polishing the magnets in order to prevent the lead or its oxide from adhering to their surfaces—the heat of the lead being only just sufficient to harden the magnets. On taking them out of the bath, I afterwards plunge them into water.

Tenthly, My invention has relation to the mode of obtaining light by electricity, for which I obtained former letters patent for England and the Colonies on the 3d day of July, 1847; and consists, first of all, in an improved mode of giving motion to the lower electrode.—*Mechanic's Mag.*

ALLOYS, SOLDERS, AND AMALGAMS USED IN THE ARTS.

The following Table was prepared by M. Chaudet, an experienced assayer of the Mint of Paris, from actual analysis of carefully selected samples. In two instances, the proportions of the composing metals are not given for reasons that, in one instance (that of the amalgam for taking impressions of seals), are obvious :—

Alloy of gold coin (French standard.)	Gold	900	1000
	Copper	100	
Alloy of silver coin (French standard.)	Silver	900	1000
	Copper	100	
Alloy of "billon" (French standard.)	Copper	800	1000
	Silver	200	
Alloy of gold medals (French standard.)	Gold	916	1000
	Copper	84	
Alloy of bronze medals.*	Copper	92	100
	Tin	8	
Alloy of jewellery (French standard.)	Gold	750	1000
	Copper	250	
Alloy of silver plate† (French standard.)	Silver	950	1000
	Copper	50	
Alloy of gold coin (United States' Standard.)	Gold	899.22	1000
	Copper and silver	100.78	
Alloy of silver coin (United States' standard.)	Silver	892.43	1000
	Copper	107.57	
Alloy of gold coin (English standard.)	Gold	916.67	1000
	Copper and silver	83.33	
Alloy of silver coin (English standard.)	Silver	925	1000
	Copper	75	
Alloy in imitation of gold	Copper	91.00	100½
	Tin	9.50	
Alloy in imitation of silver‡	Copper	61.27	106
	Zinc	28.78	
	Nickel	15.13	
	Lead	82	

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* The medals made from this alloy are cast; they have the advantage of being struck by a few blows of the press, and of wearing a long time.

† The standard here indicated is the best; a second composed of 800 of silver, and 200 of copper, in the 1000.

‡ This alloy is the Packfond of the Chinese.

Alloy for cannon*	Copper	100	111
	Tin	11	
Alloy for statues†	Copper	91.40	100
	Zinc	5.53	
	Tin	1.70	
	Lead	1.37	
Alloy for bronzes and candelabras	Copper	82.00	104½
	Zinc	18.00	
	Tin	3.00	
	Lead	1.50	
Alloy for the mounting of fire-arms	Copper	80	100
	Zinc	17	
	Tin	3	
Alloy for cymbals,‡ tam-tams, or Chinese gongs	Copper	80	100
	Tin	20	
Alloy for bells	Copper	75	100
	Tin	25	
Alloy for the reflectors of telescopes	Copper	2	3
	Tin	1	
Alloy for brass for the lathe§	Copper	65.80	100
	Zinc	31.80	
	Lead	2.15	
	Tin	0.25	
Alloy of brass for the hammer‖	Copper	70.10	100
	Zinc	29.90	
Alloy for types¶	Lead	80	100
	Antimony	20	
Alloy fusible in boiling water	Bismuth	8	16
	Lead	5	
	Tin	3	
Alloy for plugging teeth**	Bismuth	8	17.6
	Lead	5	
	Tin	3	
	Mercury	16	
Alloy for tinning iron	Tin	8	9
	Iron	1	
Alloy used to make ductile gold of 18 carats, 950 milliemes††	Copper	990	1000
	Gold	10	

* In this alloy small quantities of lead and zinc are often found, but they are present by accident.

† The proportions here indicated are the result of an analysis of the beautiful bronze statues of the garden of Versailles, which were cast by the brothers Kellers, celebrated founders employed by Louis XIV.

This alloy is very hard ; it is annealed by dipping, while red-hot, into water, and is then malleable ; whilst, if suffered to cool gradually, it is excessively hard ; this important fact is due to M. D'Arcet, who has thus furnished the means of fabricating, in France, cymbals, &c., formerly imported, at a great cost, from China.

§ The proportions here indicated having been found by analysis, it is evident that the tin is present by accident.

‖ This alloy of brass is important, and is due to M. Chaudet.

¶ Sometimes a small quantity of copper is added to these two metals.

** This alloy may be prepared with a smaller proportion of mercury ; it melts at 65° of the centigrade scale.

†† The previous combination of the alloy is found to produce ductile gold, when the same metals would prove the contrary, if mixed directly.

Alloy for bells of mantel clocks	Copper	75	100
	Tin	25	
Alloy for the pivots of artificial teeth	Platinum		
	Silver		
Alloy for ditto**	Palladium	50	100
	Silver	50	
Alloy for the springs of artificial teeth ††	Palladium	50	160
	Silver	50	
	Copper	50	
	Iron	10	
Solder for gold of 750, or 18 carats	Gold of 750	2.00	3
	Copper	0.50	
	Silver	0.50	
Solder for silver of 750*	Silver	2	3
	Brass	1	
Solder for brass	Copper	50	100
	Zinc	50	
Solder for lead	Lead	2	3
	Tin	1	
Amalgam of gold for gilding on metal	Mercury	91 to 89	100
	Gold	9 to 11	
Amalgam of silver	Mercury	85	100
	Silver	15	
Amalgam for taking impressions of seals†	Copper		
	Mercury		
Amalgam for silvering mirrors	Tin	70	100
	Mercury	30	
Amalgam for silvering globes of glass	Mercury	80	100
	Bismuth	20	
Amalgam for the cushions of electrical machines	Mercury	2	4
	Tin	1	
	Zinc	1	

Among the twenty-three metals that are not enumerated in the foregoing list, there are several that enter into alloys, but they are without utility in the arts; we should not, however, include in the remark the native alloy of osmium and rhodium, which is excessively hard, and is at present used for the nibs of metallic pens.

Care has been taken in the arrangement to name those metals first which enter in the largest quantities in the alloy.

** This alloy is extremely important: it is used for all those purposes in the fabrication of philosophical instruments for which platinum was formerly applied, being superior to it in hardness and colour, and yet inoxidable under all the usual circumstances.

†† An extremely useful alloy, having a degree of elasticity only exceeded by steel, with all the advantages of superior lightness and hardness over platinum; this, and the preceding, are due to Mr. Percival N. Johnson, of London.

* The copper and zinc ought to be taken in the form of brass; for two parts of silver take one part of brass.

† This amalgam is hard, and melts at a low heat: it was used by the French police, under the administration of the celebrated Fouché, for the purpose of opening and resealing the letters that passed through their hands.

LIQUOR ACIDI ARSENIOSI HYDROCLORICUS.

BY JONATHAN PEREIRA, M.D., F.R.S.

Hydrochloric Solution of Arsenious Acid; De Valangin's Solutio Solventis Mineralis.—Arsenious Acid, gr. xxx.; Hydrochloric Acid, gr. xc.; Distilled Water, f℥xx. Dissolve the arsenious acid in the hydrochloric acid diluted with about f℥j. of water; then add the remainder of the water to the solution.

The late Dr. De Valangin* introduced the *solutio solventis mineralis* into medical use. He prepared it by subliming in a bolt-head a mixture of 3lbs. of arsenious acid and 8lbs. of common salt. The sublimate was a white powder, which he called the *solvent mineral.* This was dissolved in diluted hydrochloric acid, and formed his *solution of the solvent mineral,* which by some persons has been regarded as a *solution of chloride of arsenic.* He presented the Apothecaries' Company with a quantity of his preparation, as well as with the formula for its manufacture.

But by submitting a mixture of arsenious acid and common salt to sublimation, no chemical change is effected. The arsenious acid sublimes unaltered. De Valangin's *solvent mineral* is in reality, therefore, nothing but this acid; and, provided pure arsenious acid be employed, the process of sublimation is unnecessary. Mr. Warington tells me that he has submitted an authentic specimen of De Valangin's solvent mineral to microscopic examination, and finds it to consist of octohedral and tetrahedral crystals of arsenious acid.

By dissolving arsenious acid in hydrochloric acid, we obtain a solution either of the *terhydrochlorate of arsenious acid,* or of the *terchloride of arsenic.* $As\,O_3 + 3\,HCl = As\,Cl_3 + 3\,HO$. According to Dupasquier,† the solution contains terchloride of arsenic; for, when it is submitted to distillation, the distilled product is arseniferous. On repeating the experiment, I find that the quantity of arsenic which distils over is very small; and that the residual liquor in the retort deposits octohedral crystals of arsenious acid.

For the preceding formula for the preparation of De Valangin's solution, I am indebted to Mr. Warington, who tells me that it is the one which is intended to be introduced into the forthcoming new edition of the *London Pharmacopœia.* De Valangin's solution is considered by some practitioners to be superior to any other preparation of arsenic. Dr. Farre, who has been long practically acquainted with it, kindly informs me that it "effectually cures the worst forms of chorea which resist other remedies. It was recommended to me," he adds, "by the late Dr. Bateman‡ for the cure of lepra vulgaris, which, although that disease may return upon you, it will cure again. It will be introduced into the next Pharmacopœia, it is said, in an improved form,—but I hope it will not be injured; for it is the only safe and effective preparation of arsenic with which I am acquainted."

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* Dr. Franciscus Josephus Pahud de Valangin, was a native of Switzerland; but practised in London. He died in 1805. A short sketch of his life, with his portrait, is given in the *European Magazine* for 1805. (See also the *Gentleman's Magazine* for the same year.) He was the author of *A Treatise on Diet, or the Management of Human Life by Physicians,* Lond. 1768.

† *Journ. de Pharmacie,* t. xxvii. p. 717, 1841.

‡ Dr. Bateman (*Practical Synopsis of Cutaneous Diseases*), in noticing the beneficial effect of Fowler's solution in the treatment of lepra, says, in a foot-note, "Another preparation, introduced by the late Dr. De Valangin, is kept at Apothecaries' Hall, under the name of *solutio solventis mineralis,* and is equally efficacious."

Although I have on numerous occasions employed De Valangin's solution, I have not hitherto satisfied myself of its superiority to the solution of arsenite of potash, which cures or greatly relieves a very large portion of the cases of chorea and lepra which usually present themselves. It is supposed to be less apt to disturb the stomach on account of its not suffering decomposition and separation of the arsenious acid, as does arsenite of potash, by the acid gastric secretion. Before its absorption, however, its acidity must be neutralized by the bases (soda of the bile principally) which it meets with in the alimentary canal. It is probable, therefore, that the arsenic of De Valangin's solution passes into the blood as arsenite of soda.

One fluidounce of the solution, prepared according to the formula above given, contains only one grain and a half of arsenious acid; whereas the same quantity of Fowler's solution contains four grains of arsenic. It is probable, therefore, that the real explanation of the infrequent occurrence of gastric symptoms under the use of De Valangin's solution is referable to the smaller quantity of arsenic usually administered.—The dose is from ♏iij. to ♏x. thrice daily. Dr. Farre tells me that he always begins with three drops three times a day, and, after a few days, increases one drop per diem (not each dose). In this way he proceeds till the patient takes ten drops thrice daily. Whenever gastric disorder supervenes, the medicine is to be suspended, and to be subsequently renewed in the original dose of three drops.—*Materia Medica*, p. 669.

ACCIDENTAL POISONING.

BY MR. R. W. GILES.

Out of the many suggestions that have been evoked by the late unfortunate accidents, I do not observe that any practicable plan has been proposed. In your article in the December number, under the head "Accidental Poisoning," you have reviewed some of these suggestions, and the Pharmaceutist is indebted to you for exposing the impossibility of those precautionary arrangements which the public were being taught to expect, at the risk of much odium to him that failed to provide them. After a careful perusal of your own suggestions, they appear to me to amount to no more than a recommendation of caution and a convenient arrangement of the bottles, &c. This is certainly of the highest importance, for whatever arrangements are adopted, it is the carefulness and accuracy of the dispenser to which the public must at last look for security. But they have also a right to demand that every possible precaution be taken to guard against those accidents to which all are liable; and though the newspapers and medical journals have allowed themselves to be carried away by an inconsiderate zeal into ridiculous extremes, it by no means follows that the present is not a fit occasion to urge additional caution to prevent the recurrence of similar accidents.

Is it not necessary for every Chemist's shop to be provided with a small locked closet for those very deadly substances which are rarely used and only kept in small quantities, in order that they may be rigidly excluded from the company of less powerful preparations? I would not propose that the key should be consigned to any one person; but *no* person should be permitted to use any article from within, without calling the attention of a second to his proceedings. This plan obviates the necessity of a poison manipulator, recommended in the visionary scheme of the *Medical Gazette*—ensures a correct reading of the prescription, the use of the proper article in the quantity directed, and doubles the chance of detection, if by any accident an improper dose has been prescribed. In

fact, humanly speaking, these deadly substances thus become incapable of misapplication. It will be important that the closet should not contain articles in frequent use, otherwise there is fear that the dispenser may tire of consulting a second, and the custom fall into disuse; for this reason, hydrocyanic acid appears to me not admissible, and it is better kept in a separate tin case, cool and excluded from light: yet to show how easily the system works, I may mention, that I have known young men, prompted merely by their own will, who have made it a practice to show their measurings of this oft-used medicine to the person nearest them in dispensing, without creating any confusion, however busy they might be.

As regards the best method of distinguishing external applications, every person must feel the justice of your remarks, and confess the impropriety of sending out such remedies without attaching a second label, "For External Use," or to that effect; but in spite of this precaution, I have known mistakes happen on the part of the patient, happily not very mischievous in their results, which I think would be more effectually guarded against, if all bottles containing external applications were covered with blue paper, as is the custom with solutions of nitrate silver. This material is always at hand, is quickly put on (no pasting being required), and has an advantage which bottles of coloured glass have not, viz., that it can be distinguished in the dark, and by a sense independent of sight.

If you think there would be any utility in publishing the above, which is founded upon a satisfactory experience of the method recommended, my object will be attained, while it is impossible that the unpublished letter can cause any mischief.

Clifton.

ACCIDENTAL POISONING.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Dear Sir,—The unfortunate case of poisoning at Romsey by the substitution of *strychnine* for *salicine*, has called forth various suggestions on the possibility of the prevention of similar fatal mistakes; but, as you justly observe in your leader, propositions from those practically unacquainted with the matter, are not very likely to be of much service. In addition to the excellent ones already named in your article, perhaps I may be permitted to mention the following two:—

With reference to the class of alkaloids and their salts, I would recommend a practice I have adopted ever since I commenced business, viz., either to prepare, or buy them ready prepared, *in their crystalline state.* Almost every salt has a distinct physical character by which it could scarcely fail to be recognised by the dispenser when weighing out the required quantity. There are very few of this class of preparations (undoubtedly the most powerful we have to deal with) which would form exceptions to this rule. I think when we have mentioned veratrine, delphine, and aconitine, we have named the principal, and of these, veratrine could hardly fail to remind the dispenser of its presence, by its power of producing violent sneezing when weighing out even the smallest quantity. Morphia and its salts are now to be purchased in a most beautifully crystalline state, and the difference in expense I have found in some instances to be very slight, in others, none at all. This, however, should not for one moment be considered, if we can by such means secure ourselves from the recurrence of so sad an event as that before alluded to. Had the strychnine presented to the eye of the dispenser its large square

prisms, instead of the appearance of a greyish white powder, it is my firm belief the substitution never could have occurred. Another important advantage in thus purchasing them is, that the Druggist is much more certain of obtaining a genuine article, when in the form of crystal, than when otherwise.

The second suggestion I would make, is in reference to the labelling of the bottles containing medicaments for external application. It has been the practice with many houses for some time, to send them out in coloured bottles (blue or violet) but this practice, if not uniformly carried out, is of no avail, as "danger is incurred from the habit of depending on the colour of the bottle," as you well observe, and a "blue bottle of the right size may not always be at hand;" in fact, I do not think they are procurable in all sizes. But a very simple plan, and one which all can easily adopt, and which is not liable to this objection, is that which has long been used by one of the largest establishments at the west-end, viz., to send out every external application with the directions written on a *yellow label*, which, of course, should be attached with paste. This hint I would recommend particularly to the attention of all printers and engravers, and those engaged in preparing labels for the trade, as I am convinced it is a practicable one, and of universal applicability. Many individuals have lost their lives simply from the accidental administration of a lotion instead of a mixture, the labelling on both bottles being so similar, as was unfortunately the case with Mrs. Betts, near Leicester, a few years since.

I am, dear Sir, your's truly,

JOHN FORDRED.

Church Street, Hackney.

THE PREPARATION OF META-ANTIMONIATE OF POTASH AS A TEST FOR SODA.

BY M. FREMY.

THE author observes, that since the publication of his first memoir on the antimoniates, the meta-antimoniate of potash has been generally employed in laboratories as a test of the salts of soda; and as the preparation of this salt has been found difficult by several chemists, the author states the following to be the process which he now employs, and by which he obtains in a few hours nearly two pounds of meta-antimoniate of potash.

He begins by acting upon one part of antimony with four parts of nitre in a red-hot earthen crucible; insoluble anhydrous antimoniate of potash is formed, which is washed with cold water to remove the nitrite and nitrate of potash, an excess of which it usually retains.

The antimoniate of potash is then boiled for two or three hours in water, in order to convert it into the gummy soluble antimoniate; water is to be added to supply the loss by evaporation. During ebullition the greater part of the antimoniate dissolves, there remaining but a small quantity of bi-antimoniate of potash, which is separated by the filter.

The solution of the gummy antimoniate of potash is then evaporated, adding to it several fragments of pure hydrate of potash so as to render it very caustic. A few drops of the solution are tried from time to time to see whether on cooling they become crystalline; and when this takes place, the evaporation is to be discontinued, the meta-antimoniate of potash then crystallizing abundantly; the alkaline solution is to be poured off, and the salt is to be dried on porcelain plates.

This salt always contains an excess of alkali; it ought to be washed two or three times before it is used as a re-agent. As the meta-antimoniate of

potash decomposes in solution in water, it should be kept in the dry state and dissolved when wanted.

To make an examination, which scarcely requires ten minutes, about fifteen grains of the potash to be tried should be dissolved in a small quantity of water and supersaturated with hydrochloric acid, and the solution evaporated to dryness in a porcelain or platina capsule. The chloride of potassium, being then perfectly neutral, is redissolved in water and treated with the solution of meta-antimoniate of potash. If the potash contains 2 or 3 per cent. of soda, a precipitate is almost instantly formed; but if the quantity be smaller, time and agitation will be necessary to effect precipitation.

M. Fremy states the sensibility of this re-agent to be so great, that he found by synthetic experiments he could detect a half per cent. of carbonate of soda in commercial potash.—*Ann. de Ch. et de Phys.*, Août, 1848.

ON GOUT PAPER.

BY M. BUCHNER.

Michaleskul's gout paper is thus prepared: Three drachms of gum euphorbium and six drachms of cantharides, are powdered and digested with four ounces of spirit of wine of ninety per cent., and three drachms of Venice turpentine are then added. Fine paper is then to be dipped into this tincture and dried in the air. At Jassy, this paper is sold under the name of "*Papier Faiard*," or "*Papier Schemik*." According to Mohr's *Pharm. Univ.*, four drachms of cantharides and one drachm of gum euphorbium are to be digested with five ounces of highly rectified spirit of wine: to the filtered liquid are added one and a half ounces of Venice turpentine, and two ounces of resin. These being melted together, and mixed with the tincture, are to be spread thinly on the paper whilst warm. According to the *Wurtemberg Pharm.*, one and a half ounces of euphorbium, and the same quantity of cantharides, are digested with four ounces of highly rectified spirit of wine for eight days, and the tincture then melted with seven ounces of pitch, three ounces of resin, three drachms of turpentine, and two and a half drachms of linseed oil, and the spirit of wine evaporated. The residue is to be applied, by means of a plaster-machine upon well-sized paper. According to the *Codex Med. Hamburg.*, the euphorbium is omitted; four drachms of cantharides are treated with four ounces of alcoholised ether, two ounces of elemi, one ounce of balsam of tolu, one drachm of balsam of Peru dissolved therein, and then mixed with three ounces of resin and one and a half ounces of Venice turpentine. The mixture is to be heated till the spirit is evaporated, and when it has acquired the consistency of treacle, it is to be spread on paper. The *Baden Pharmacopœia* substitutes resin of mezereon for the cantharides and euphorbium. It is obtained by means of highly rectified spirit of wine from mezereon bark, and is purified by ether. Twenty-four grains of this resin are to be mixed with four ounces of lard, six drachms of white wax, and four drachms of spermaceti, and the whole melted together. Paper is to be coated with it three times. According to Cerutti, the paper is to be spread over with a mixture of pitch, resin, wax, and turpentine. The new *Pharm. Boruss.*, of 1826, prescribes the preparation of a *charta resinosa*, by spreading pitch on paper.—*Pharmaceutisches Central-Blatt, June* 24, 1848.

ON A CRYSTALLIZABLE HYDRATE OF SULPHUROUS ACID.

BY M. DÖPPING.

If pure sulphurous acid gas be passed into water, contained in a vessel surrounded by ice, the solid hydrate of sulphurous acid separates in a crystalline form, as soon as the water becomes saturated with the gas. The crystals redissolve at a few degrees above the melting point of ice, and again precipitate on cooling (a few degrees below 32° Fah.). They then constitute a mass of cubic crystals.

These crystals are composed of SO_2 HO. At 26.6° Fah. they can be separated from the supernatant liquor, dried between blotting paper, and preserved in dry vessels. Between 30.2° Fah. and 27.4° Fah. they begin to become moist and melt with the evolution of sulphurous acid. If they are placed over sulphuric acid at 23° Fah. the latter gradually deprives the sulphurous acid compound of its water, so that it becomes decomposed.

For the purpose of the analysis the author, by means of a funnel, separated the crystals from the fluid, at a temperature of from 26.6° Fah. to 24.8° Fah., and then pressed them between blotting paper. They were weighed in closed tubes at a temperature of 32° Fah., and then treated with strong chlorine water, when the sulphurous acid was determined as sulphuric acid. The analysis showed,

Sulphurous Acid	76.02	79.16	76.82	1 = 32	78.05
Water	23.98	20.84	23.18	1 = 9	21.95
	100.00	100.00	100.00	41	100.00

[These cubic crystals are consequently different from the compound obtained according to De la Rive, by cooling moist sulphurous acid gas in laminæ, and, in the form of snow, by evaporating the liquid acid, since he found nearly 80 per cent. water in it.]—*Redacteur.*

According to Döpping there is another compound of sulphurous acid with water. If the fluid from which the above-described hydrate has separated be exposed to a temperature of from 21.2° Fah. to 19.4° Fah. it congeals into a mass of tabular crystals. As soon as the temperature approached 32° Fah. the crystals again become moist, and at 28.4° Fah. they had all melted, showing that they were different from those first described. Döpping says, he has not been able to produce the combination of De la Rive.—*Pharmaceutisches Central-Blatt, June* 24, 1848.

EXPERIMENTS ON SENNA AND ARGOL LEAVES.

BY HEBERLEIN.

According to Heberlein, spirit of wine extracts from senna-leaves only chlorophylle and extractive matter, the *cathartine* of Lassaigne and Feneulle, which does not, however, possess in the slightest degree the purgative effect ascribed to it by these gentlemen; for after repeated experiments with smaller quantities, the alcoholic extract of one and a half ounces of folia sennæ were taken without any effect. The uselessness of treating senna-leaves with spirit of wine, and the inefficacy of tinctura sennæ are therefore obvious. The aqueous extract of four drachms of senna-leaves, which had first been exhausted by spirit of wine, effected evacuations with griping; so that the griping principle had not been removed by the spirit. The leaves used for these experiments were those of Tripoli senna, which are quite free from the leaves of *Cynanchum Arghel.* The latter, which are found among the Alexandrian senna, are in bad favour among physicians, but without just grounds, for experiments made with the picked leaves of *Cynanchum Arghel* showed them to be harmless. An infusion of two and a half drachms produced no effect or inconvenience.—*Pharmaceutisches Central-Blatt,* No. 54.

PASSAGE OF HYDROGEN THROUGH SOLID BODIES.

M. Louyet states, that if a current of hydrogen gas emanating from a capillary orifice be directed against a sheet of paper, held a few milimetres from the orifice, so that the current be perpendicular to it, the paper is traversed by the gas. But the gas is not sifted through, as might have been expected ; it passes as a current, and may be inflamed behind the paper as though nothing intervened between the gaseous current and the ignited matter ; and further, spongy platinum becomes incandescent behind the paper, in the path of the current, if the paper be three or four centimetres from the orifice, provided the metal is placed against the paper, or, at least a very slight distance from it. The pressure under which the phenomenon is produced does not exceed from ten to twelve centimetres of water. To my great surprise, M. Louyet adds, I have established that hydrogen gas traverses with equal facility gold leaf and beaten silver. Thus surround spongy platinum with several folds of gold or silver leaf, and direct against it a current of hydrogen, the platinum will become incandescent, and the gold or silver will adhere to its surface. Behind leaf tin also, spongy platinum is, in like manner, strongly heated. Through a thin membrane of gutta percha, such as is obtained by evaporating a slight layer of it from a solution in chloroform, hydrogen likewise passes ; but hydrogen gas does not sensibly pass through pellicles of blown glass, however thin they may be.—*Literary Gazette.*

ADULTERATION OF SULPHATE OF QUINA WITH SALICINE.

The adulteration of quina with about thirty to forty per cent. of salicine was detected by Streseman, in a quantity of sulphate of quina, which he had obtained from a wholesale Druggist, and which was said to have been imported from England. On sending it back, he was informed by the merchant that he had already sold as much as 180 pounds of the same preparation to several apothecaries, without its having been returned. This shows the necessity of examining all preparations obtained in commerce.—*Pharmaceutisches Central-Blatt*, Dec. 18, 1847.

REVIEWS.

The Elements of Materia Medica and Therapeutics. By Jonathan Pereira, M.D., F.R.S,, F.L.S., &c., &c. Third Edition, enlarged and improved, *including Notices of most of the Medicinal Substances in use in the civilized world, and forming an Encyclopædia of Materia Medica.* Vol. I. 8vo, pp. 897. London : Longman and Co.

Many of our correspondents have been for some time past impatiently looking forward to the appearance of a new edition of this work, and we have much pleasure in announcing the first volume.

The character of the work is so well known and so universally appreciated, that we think it needless, on the present occasion, to enlarge upon its merits. Dr. Pereira is always in advance of the times in Materia Medica, and whenever a doubt exists in reference to any subject which comes under his notice, his perseverance in clearing it up is only stimulated by difficulty. For example, we may advert to an extract from the above work (in another part of this number) on De Valangin's Solutio Solventis Mineralis, a preparation respecting which various rumours have been for many years in circulation, but

no authentic information was obtained as to its history and composition. The mystery is now cleared up and although in the present instance the result is of comparatively small importance, we advert to it as an illustration of the manner in which every subject coming within Dr. Pereira's grasp is sifted to its source, and shorn of its doubts or ambiguities.

When the second volume makes its appearance, we intend to give a more general notice of the whole work, with reference to the improvements and new matter contained in the present edition.

PRACTICAL PHARMACY; *the Arrangements, Apparatus, and Manipulations of the Pharmaceutical Shop and Laboratory.* By FRANCIS MOHR, PH. D., Assessor Pharmaciæ of the Royal Prussian College of Medicine, Coblentz, and THEOPHILUS REDWOOD, Professor of Chemistry and Pharmacy to the Pharmaceutical Society of Great Britain. Illustrated by 400 Engravings on Wood. London: Taylor, Walton, and Maberley, Upper Gower Street, and Ivy Lane, Paternoster Row. 8vo, pp. 384.

THIS work is original in its design and complete in its execution. To the young Chemist about to commence business it furnishes all the information he could desire respecting the arrangement of a shop, laboratory, and apparatus. The most minute details are described with great accuracy, and the illustrations are so well executed and so numerous, that a cursory inspection of the work is sufficient to convince the reader of its great practical utility. It is the kind of work for which there has long been a great demand in this country, comprising a very complete account of all pharmaceutical operations, with the various modes of conducting them, as well as the apparatus. It would be needless to enumerate in detail the subjects treated of, as we presume that the work itself will have an extensive circulation among our readers, many of whom have for some time past been inquiring when it would be published. A specimen, with several of the engravings, is contained in our last number.

THE LONDON AND PROVINCIAL MEDICAL DIRECTORY, 1849. London: John Churchill, Princes Street.

THIS system of REGISTRATION is becoming more complete every year. The *Medical Directory* has become an authority in reference to qualification and standing in the profession. The editors have used every endeavour to rectify errors and supply deficiences, and if their efforts have not been attended with complete success, the fault lies with the parties who have failed to respond to the repeated communications of the editors requesting information. There are always a number of persons who appear to take a delight in frustrating (so far as lies in their power) any undertaking of this nature. The London Supplemental List still contains 150 names of gentlemen who prefer to enjoy an equivocal *incognito*, rather than take the trouble to send two lines to the editors stating the nature of their qualification. The number of "*incogs.*" in the country list, is, as might be expected, much greater. If a Supplemental List be published at all, we think it should be headed "Supplemental List, supposed to be Quack Doctors." Those who might object to be on such a list, would have their remedy at an expense of a penny postage stamp—and those who have no right to object might be struck off the list. By this means

the completion of the system of registration would be expedited, an object which all the members of the profession would do well to promote. We should be glad to see Chemists included in the *Directory*.

MONTHLY RETROSPECT OF THE MEDICAL SCIENCES. Edited by ALEXANDER FLEMING, M.D., and W. T. GAIRDNER, M.D. February to December, 1848; with plates, &c. Edinburgh: Sutherland and Knox, George Street. London: John Churchill. 8vo, pp. 272.

THE HALF-YEARLY ABSTRACT OF THE MEDICAL SCIENCES; *being a Digest of the principal Medical Works during the past Six Months, with a series of Critical Reports, &c.* Edited by W. H. RANKING, M.D., Cantab, &c., &c. Vol. VIII., July to December, 1848. London: John Churchill, Princes Street. Edinburgh: Maclachlan and Co. Dublin: Fannin and Co. 8vo, pp. 424.

HAND-BOOK OF CHEMISTRY. By LEOPOLD GMELIN. Vol. I. Translated by HENRY WATTS, B.A., F.C.S., Assistant in the Birkbeck Laboratory, University College, London. Printed for the Cavendish Society.

It will be observed, from an advertisement in another part of this Journal, that the above valuable work is now ready for distribution to the Members of the CAVENDISH SOCIETY.

OBITUARY.

ON January 14th, at his residence, West Hill, Wandsworth, JOHN BELL, late of 338, Oxford Street, London.

TO CORRESPONDENTS.

H.—A good red-colour, suitable for an external lamp, may be made by colouring oil of turpentine with alkanet root.

H. M.—There is a formula for *Tinctura Nucis Vomicæ* in the Dublin Pharmacopœia, as follows:—℞. Nux vomica, scraped, ℥ij.; Rectified spirit f.℥viij. Macerate for seven days and filter.

Cambria, A.P.S.—*Noad's Lectures on Electricity*, and Knight, Foster Lane.

Ignoramus (*Leamington*).—*Parnell's Chemical Analysis.* Annatto may be used for giving a yellow colour to oils.

Ignoramus (*Exeter*) should obtain *Parnell's Chemical Analysis*, where he will find the necessary instructions for the processes of chlorimetry and alkalimetry. These processes are also treated of in detail in vol. ii., page 563, and vol. iii., page 430, of this Journal. There is no more simple method than those above referred to that would be efficient.

Pharmacien.—(1.) We do not know any work corresponding to the description.—(2.) We have not observed the result described. If it occurs as stated, the product should be examined.

Pharmacien, No. 2.—(1.) *Hoblyn's Dictionary*, or *Hooper's Dictionary.*—(2.) A formula was published some years ago in vol. i., page 598, of this Journal, by Mr. Tyson, of Ashbourn, for Liquor Oxysulphatis Ferri, as follows:—℞ Sulphate of iron, ℥ij. (or ℥iij.); Nitric acid, ℥iij.; Distilled water, ℥iss. Rub the sulphate of iron and nitric acid together for a quarter of an hour, then add the water, and filter.

Dolichos Pruriens.—(1.) The specimen of salt is a mixture of biniodide of mercury and nitrate of mercury.—(2.) Peroxidize the salt with nitric acid and heat, and then add iodide of potassium.

S. A. G. and *Alpha.*—For Tooth Cements, see vol. iii., page 589.

A. Z.—Chiefly the natural system.

J. F. (*Doncaster*).—German yeast is imported from abroad. We know of no method of preserving it.

Curiosus.—(1.) Yes.—(2.) Pastorelli, Hatton Garden.—(3.) Phillips, by the Pantheon, Oxford Street.

M.P.S.—Stains of nitrate of silver may be removed by washing, first with a solution of iodide of potassium, and afterwards with solution of hyposulphite of soda, repeating the process if needful.

J. G.—The mixture containing iodide of potassium, sweet spirit of nitre, and syrup of ginger should be colourless, or nearly so. If free acid be present in the spirit, the iodine would act on the starch contained in the ginger. The only method of ensuring uniformity of colour is to pay attention to the purity of the ingredients.

T. A. A.—We think an adhesive material, soluble in water, is not adapted for corn plaster.

M.P.S. (*Henley-on-Thames*).—The solution of bimeconate of morphia was introduced by Mr. Squire : we have not seen the formula for its preparation, but it is stated to be the same strength as laudanum.

F. G. M.—Pills may be coated with gelatine by dipping them in the gelatine when in a fluid state, the pills being supported on pins, which are withdrawn when the gelatine has become hard.

F. P. A.—The parties alluded to ought to learn the old and new names without encumbering the Price-book with needless tautology.

C. R. Q.—See Vol. vii., No. 7. The best method of employing a few spare months, and preparing for the examination, would be attendance as a practical pupil in the laboratory of the Society.

A Dispensing Chemist (*Islington*), should write to the Secretar, giving his name and address.

B. B. is under a delusion, and should refer again to the passage, which he has misunderstood. The exception alluded to applies to the case to which he refers.

M.P.S. (*London*).—Emplastrum Plumbi is not altered by the employment of the glycerine, which is thrown away if not used.

A Constant Reader (?).—We have given several formulæ for Lavender Water. The following is a good one :—℞ Ol. lavand. ang. ʒvj ; Ess. ambrag. c. mosch. ʒiv ; Sp. vini. rect. ℥xv. ℿ.

An old Member of the P. S. suggests the restriction of Sunday business to medicines in the strict sense of the term, observing that the sale of cigars on Sunday is "degrading to the profession," which we think it is.

The Infant Orphan Asylum.—On a former occasion we mentioned the case of one of the children of Mr. Bridge, of Regent Street, formerly a member of the Pharmaceutical Society, and in consequence we received several proxies for the last election, at which the child was fortunately admitted. Another member of the family, Hippolyte C. Bridge, is a candidate for the April election, and we take this opportunity of appealing to the Members of the Society on behalf of this child, whose father is reduced to a condition of confirmed lunacy by a concussion of the brain, the family being in great difficulty.

Advertisements to Mr. Churchill, Princes Street, Soho.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the Editor, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. IX.—MARCH 1st, 1849.

THE REVIVAL OF MEDICAL REFORM AGITATION.

The opening of Parliament is the signal for all parties who have anything to gain or to lose by prospective legislation to renew their activity. Financial reform is the order of the day, and this is supposed by the mass of the people to be a question coming home to each individual. Outwardly it is a popular question; behind the scenes it is too often merely a "hue and cry" raised for political purposes—a means to attain an end—a lever to raise a party.

Medical reform is not a popular question. It is generally supposed to be a commotion among the doctors, and this impression has been confirmed by the contradictory and conflicting statements, the skirmishes, marchings, and counter-marchings of the parties concerned, as contrasted with the stationary condition of the question itself. So, Eddystone lighthouse is lashed on all sides by the waves of the ocean, each wave in succession foams and roars and then gives place to the next, while the fabric itself is viewed by the public from a distance as a beacon to be avoided.

Medical reform in the only sense in which it is deserving of legislative interference, is a public question. Viewed in any other light it is a party struggle—a trial of strength between rival candidates for patronage—a bubble which if left unheeded would burst. If it be the province of a good government to legislate for the protection of property, the protection of life and health, without which property is of no value, is obviously an equally legitimate object of jurisdiction. Inasmuch, therefore, as medical reform is abstractedly an improvement in the regulations respecting the qualification of those to whose care the public health is entrusted, it is a public question, and would, if taken up in a proper spirit and generally understood, become a popular one.

Leaving abstract principles for the present, let us take a brief review of the progress of events. Another ponderous volume of evidence is before us, the result of the labours of the Medical Registration Committee during the last session. If it be said that Pharmacy is not comprised in the question, and that, it is, therefore, out of our province, we reply that the pharmaceutical body is deeply interested in the result, since we are told that Medicine, Surgery, and General Practice must be settled first, and Pharmacy is to follow in the rear. We, therefore, look on as passive specta-

tors, anxious for the arrival of the three trains at the station, as the signal for turning on the steam ourselves. It is an anxious moment, for if each train should keep its proper place, and preserve that order which is "Heaven's first law," we may hope to see the journey safely accomplished, and then it will be our turn to proceed. But in case the "Parliamentary" train should get the first start, the "express" will run it down, a collision will ensue, and it may be a long time before the fragments are collected together and the road made passable.

In elucidation of the metaphor we might quote voluminous extracts from the Parliamentary evidence, showing the direction, the curves and the gradients of the several engines (or schemes) which have been launched, with the pace and policy of the respective engine-drivers (or advocates). But we shall be content to give in concise plain English a general idea of the condition and prospects of the profession in reference to the long expected medical reform. Medical Practitioners in the broadest sense of the term are of two kinds, qualified and unqualified—or medical men and quacks. The legitimate object of medical reform is to regulate the qualification of medical men, and to restrain or discountenance the quacks. If this one object simply were kept in view, the task would be easy. Ignorance would soon be at a discount, the schoolmaster would prevail, and the public health being protected, each individual in the profession would find his level.

But the medical profession comprises three grand divisions, Physicians, Surgeons, and General Practitioners; and these three bodies leaving the quacks to manage their own affairs, become entangled in certain abstruse questions as to the form of government and the doctrines of priority, equality, and speciality. Hitherto the Physicians and Surgeons have held the highest rank in the profession on account of their more extended curriculum of education, and the more advanced age at which they receive their diplomas. But the General Practitioners, being by far the most numerous class, and having of late years raised their qualification from that of Apothecaries, or Chemists and Druggists, to fully fledged Medical Practitioners, have imbibed the popular prejudice of the age in favour of a democratical form of government, and repudiate the idea of an inferior grade, as repugnant to that equality which on the other side the Atlantic is considered to be every man's birthright. About nine months ago, when Europe was convulsed, when kings and nobles were bowled down like ninepins, and even England showed symptoms of the epidemic, the principles of the "one faculty" scheme might have had some chance of support, if the members of the legislature had not been otherwise engaged; but a re-action has taken place, tranquillity is restored, and Consols have risen from 79 to 94—a striking indi-

cation of the confidence of the public—while the opinion is daily gaining ground that—

> " Order is Heaven's first law, and this confessed,
> Some are and must be greater than the rest."

It would now be difficult to subvert or overrule that classification of the profession which has been created by the wants of the public. That this will be attempted there is no reason to doubt. It has been the distinguishing feature of all the numerous Bills which have been brought before Parliament during the last ten years, that they have been framed apparently not so much for the protection of the whole profession and the public against quacks, as for the specific amelioration of the condition or standing of the particular class in the profession from which the several Bills respectively emanated. This is the reason that each Bill passes current so long as it is headed with the words " Confidential, for the use of the Committee ;" but as soon as it meets the light, it is cut to pieces by the other Committees.

We are told by the Editor of the *Lancet*,

> " Nothing but a comprehensive re-arrangement of the whole profession can weed it of the quackery of the ignorant pretender, and the equal quackery of the fellows of the Colleges, who assume superiority from a title which is no test of moral or scientific distinction."

The proposed re-arrangement reminds us of what takes place when the Tories go out of office and the Whigs come in. The same machinery continues in operation, and the same abuses, but in fresh hands. Human nature is the mainspring on both sides; as in the case of two buckets in a well—one up the other down—the centre of gravity attracts both, although *apparently* in opposite directions. Abuses will always exist in human institutions, and the possession of power requires moral restraint to preserve equilibrium. The consciousness of security is the first symptom of danger,—

> " Let him that thinketh he standeth take heed lest he fall."

Democrats, like balloons, rise when inflated. A home thrust lets out the gas, and they fall in a state of collapse. A little blood being extracted by *The Lancet* *, in the form of a subscription to a " £500 fighting fund," and a further supply of *gas* being generated by the *Medical press*, the game is kept alive—more beneficially to the trade of printing than to the profession of Physic.

The grievance complained of by the General Practitioners is that of being placed in an inferior grade. It is argued that a qualification in two departments is superior to a qualification in one. This is as plain as " one and one make two." But if it can be shown that the amount of education in the two cases is reversed, the hypothesis

* See *The Lancet* of Feb. 24, page 211.

falls to the ground, on the same principle that *two* sovereigns are worth *less* than *one* five-pound note. To remedy this, it is proposed to extend the education of the General Practitioners so as to entitle them to enjoy the same rank as Physicians and Surgeons. On this subject we quote the opinion of Professor Christison :—

"*Sir H. Halford.* Do you apprehend that there is any danger or inconvenience to be apprehended from the period or extent of the studies of the General Practitioner being fixed too high, or from the age being fixed too high ?—*Dr. Christison.* Very great danger; the danger of General Practitioners being reduced too much in number; so that the less peopled parts of the country would, in defiance of legislative enactment, fall into the hands of irregular practitioners.

"So that in fact the object would be defeated by requiring too much of them ?—It appears to me so."

Thus the question tested by the wants of the public resolves itself into the plain matter of fact, that a large number of Practitioners are required, possessing what may be termed a "state qualification" to practise in populous districts, small towns, and country villages, and a small number of Practitioners, possessing special qualifications of higher order to meet the demands of the wealthy, in localities where the division of labour is admissible. The *status* of each Practitioner will depend, first, upon the amount of his capital as influencing the limit of his education; secondly, upon his talent, which is the lever—education being the fulcrum. No Act of Parliament can raise to a high rank those who have neither capital nor talent. Those who have both require no Act of Parliament to place them in their proper position. Between the two extremes each individual must take his station according to his "specific gravity." The legislature can do no more than regulate the "state qualification," which should be possessed by all who are licenced to practise, and guard against monopoly in the higher branches, thus giving full scope to individual enterprise and merit.

The relative proportions of the several classes of Practitioners will be regulated by the demand of the public, and the victory over quacks may be gained without resorting to the chimerical project of "re-arranging the profession."

We conclude with an extract from Professor Christison's evidence on the practice of Pharmacy.

"1949. Do you think it would be desirable that General Practitioners, generally speaking, should not practise Pharmacy for profit ?—*I consider it desirable that General Practitioners should not practise Pharmacy wherever the drugs can be easily obtained by the public from a Chemist and Druggist; in short, I consider it very desirable that the practice of medicine and surgery, practised as such, should be separated as far as possible from the practice of Pharmacy.*

"1950. You think it objectionable that the mode of remuneration should be by Pharmacy ?—So objectionable, that in many parts of Scotland, where the practitioner exercises Pharmacy, he either charges not at all for his medicines, or charges merely a fair remunerative price; in short, his practice of pharmacy is of no consequence to him, he would

rather be without it; but he is obliged to practise it, because there is no Chemist and Druggist in his neighbourbood to whom his patients can apply.

"1951. Would it, therefore, be desirable to make a general rule that General Practitioners should not practise Pharmacy for profit?—No, it could not be made a general rule, because there are many parts of the country where no Chemist and Druggist could obtain a living; the whole departments of the profession, in short, must be combined in one frequently, in small towns and villages, and in rural districts."

THE MEDICINE STAMP ACT.—FRAUD AND ATTEMPT AT EXTORTION.

We regret to learn that our repeated expositions of the several provisions of the Medicine Stamp Act have not been effectual in putting a stop to the annoyance occasioned by writs and penalties. Once more we appeal to those who may have failed to pay attention to the subject, advising all our members to read the articles already published,* which point out the line of demarcation between medicines requiring a stamp and those which do not, thus giving every Chemist the opportunity of escaping the penalties by understanding the law. We fully believe that ignorance of the law is a source of the evil, and that most of the parties against whom proceedings have been commenced, have been no less astonished than annoyed at prosecutions being threatened when they were quite unconscious of guilt. It has, indeed, been frequently urged by the defendants as a plea entitling them to indulgence, that they have sold the medicine in question without a stamp for many years, and had not the least idea that a stamp was required. Thus in many cases the accused, by way of exculpation from one offence, places in the hands of the Commissioners of Stamps an admission which might be used as evidence of his having committed many more. We can testify from personal knowledge and information, courteously furnished at Somerset House, that the Commissioners do not take advantage of the full powers they possess, but in general exercise considerable leniency, never knowingly commence proceedings in any doubtful case, and suspend them whenever an explanation or plea is put in which, in their opinion, appears to claim indulgence. In the form of letter, which constitutes the "first shot" in these occasions, Mr. Timm states, "I give you this intimation in order to afford you an opportunity of offering any explanation or statement of extenuating circumstances, with a view to induce the Commissioners either to forego the proceedings or to mitigate the penalty."

But it is not from the Commissioners themselves that the greatest danger or hardship is to be apprehended. The system of *espionage*, adopted according to law for the purpose of enforcing the Acts in question, is carried on by means of informers in the pay of the Commissioners, these informers being persons of a certain class, not dis-

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* See vol. viii., p. 153; also vol. vii., p. 361 and 452.

tinguished for high moral feeling or delicacy in swearing. Over these persons the Commissioners themselves can have but little controul, since the articles alleged to have been purchased (often at distant parts of the country) are sent up as evidence, with the usual form of declaration, while the accused is unconscious of the trap into which he has fallen, and may be perfectly innocent without possessing any means whatever of rebutting the charge.

The following case will serve to illustrate the relative position of the accuser and the accused, and to shew how easily the Commissioners may be deceived, and an innocent man persecuted and plundered.

Mr. James Sewell, of Kirkstal Road, Leeds, received from Mr. Timm the usual "random shot," dated 24th January, threatening Exchequer process for the alleged offence of selling "on the 16th ultimo an article of medicine (cholera mixture) chargeable with stamp duty, without having a stamp thereto affixed—one penalty of £10."

Mr. Sewell sent a copy of the letter, with a repudiation of the charge to the Editor of this Journal, who immediately called at Somerset House, saw the medicine with the envelope recommending it for the cholera. The medicine was a light brown liquid, in an ounce vial, without a label, the cork cut short and tied over with pink paper. An accurate description of the article having been furnished to Mr. Sewell, he forwarded, by return of post, a description of his cholera mixture, and sent a bottle of it for comparison. It was a dark brown liquid in a four-ounce bottle, properly labeled and stamped, the cork not tied over with pink paper, and it was enveloped in a shop-bill similar to the former. Mr. Sewell stated that he never had used pink paper for tying over his bottles since he commenced business. He also mentioned that his shop-bill, recommending the cholera mixture, had been distributed over the counter, having been given indiscriminately to persons asking for information on the subject.

Here then was a very probable solution of the mystery. The Solicitor of Stamps, on being informed respecting the suspicious circumstances of the case, wrote to the Inspector at Leeds, who applied to the informer, who, as might have been expected, volunteered any amount of swearing in support of his allegation. There was, however, sufficient doubt thrown over the case to demand a suspension of the proceedings; and it became a question whether it might not be advisable for the defendant to become plaintiff, and proceed against his accuser.

Pending further inquiry, no steps were taken on either side for some weeks.

On the 19th of February, Mr. Sewell received the following letter, with the letters O. H. M. S. outside :—

"Sir,—I beg to state that I am fully acquainted with all the particulars of the prosecution commenced against you by the Honourable the Commissioners of Stamps and Taxes, for selling a bottle of cholera mixture without having a stamp thereto affixed, and as I have the means of proving your innocence, I can get you off without having any fine to pay to the Board, if you think proper to enclose half a sovereign and a copy of the last letter you received from Mr. Timm, in reply to your denying the offence.

"If you agree to these terms, please direct to John Smith, Clerk, Post-office, Hull, on or before Tuesday next, when you will shortly be acquitted.

"I am, Sir, your obedient servant,

"JNO. SMITH."

"P.S.—From my peculiar knowledge of all the business, I can easily perform what I have said."

A copy of this letter was immediately forwarded to the Editor, who, on presenting it at Somerset House, was informed that this was by no means a solitary instance, the Board having received information of several similar attempts to extort money, which proceedings were at that time the subject of investigation.

We publish this case as a caution to Chemists in general, as it is not improbable that John Smith is a member of a numerous family, widely distributed over the country, and in close connection with the family of the Browns, employed to do dirty work for the Commissioners of Stamps. Our readers will perceive that no Chemist, who has in circulation a shop-bill recommending a medicine for any disorder, is secure against the plots of Messrs. Smith, Brown, and Co. Smith, under pretence of being a customer, can easily send a person for a shop-bill, telling him to put it in his pocket, and say that he will call again, as he wants the medicine for a friend. Brown having received the bill from Smith, incloses in it a bottle of medicine procured for the purpose, and hands the same to the Inspector, who seals the parcel with the official seal, and transmits it to Somerset House. The defendant is taken by surprise, and is deprived of sleep by the dread of an Exchequer process. Smith sends him, by way of opiate, a letter, of which we have given a specimen. His perplexity is increased tenfold. He has no means of resisting his unseen foe. He has no data to guide him except the mysterious threat of an Exchequer process, with a ten pound penalty, and the still more mysterious promise of an acquittal from an offence which he has not committed, by the payment of ten shillings to a man whom he has not seen. He is blindfold between two traps. If he take a step in either direction he will be caught—if he stand still he will be exchequered.

In the instance above recorded, the accused, although innocent, was exonerated by a mere accident, in default of which he would gladly have made his escape from the snare by the payment of two or three pounds in the same manner as a man attacked by a footpad would gladly deliver up his purse and watch in preference to removing his neckcloth.

We advise all who may receive threatening letters from the Stamp Office to refer to the articles on the Stamp Act, already alluded to in this Journal, in order to ascertain positively whether the accusation be well founded or not. To those who, on investigation, discover that they have inadvertently violated the law we may give this general instruction—Write a letter to the Commissioners, acknowledging the fact with regret, mentioning any extenuating circumstances which may be applicable to the case, and promising not to repeat the offence. Those who are conscious of their innocence, or in doubt as to the interpretation of the law, are advised to give us immediate information in order that a proper investigation may take place. We are at all times glad to afford any assistance in our power on such occasions.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

PHARMACEUTICAL MEETING,
WEDNESDAY, FEBRUARY 14th, 1849.

MR. MORSON, PRESIDENT, IN THE CHAIR.

The Chairman, in opening the meeting, alluded to the death of Mr. John Bell and Mr. Fownes, of whom, he said, there would no doubt be suitable notices in the pages of the *Pharmaceutical Journal.*

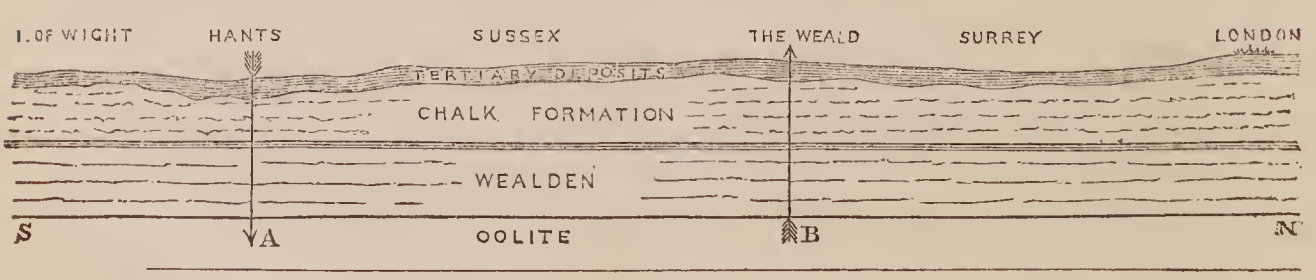
ON PREPARED CHALK AND PRECIPITATED CARBONATE OF LIME.

BY DR. PEREIRA, F.R.S.

Dr. Pereira stated verbally to the meeting, that he had been recently induced to examine the microscopic characters of precipitated carbonate of lime in consequence of the interesting results obtained in the examination of the combinations of magnesia and carbonic acid.* But not having been able to devote sufficient time to the investigation, he had endeavoured to induce Mr. Deane, of Clapham, an able microscopic observer, and a member of the Pharmaceutical Society, to take up the subject. At the request of Mr. Jacob Bell, he (Dr. Pereira) had undertaken to state at this meeting the results which he had obtained, and he was obliged to do it verbally as he had not had time to write a paper on the subject. He proposed, therefore, first to give a sketch of what had hitherto been made out with respect to the common prepared chalk of the shops, and then to state what he had observed with respect to precipitated carbonate of lime.

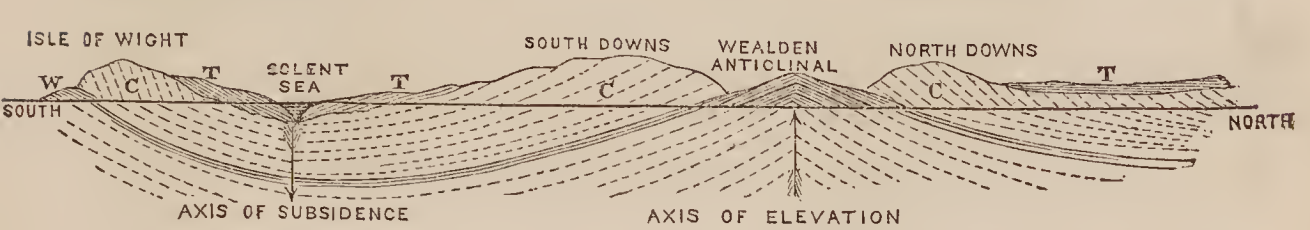
1. *Prepared Chalk.*—It is well known that the prepared chalk sold by Chemists, and used in medicine, is procured from whiting, which is obtained from native chalk.

The *chalk formation* of the geologist belongs to the fossiliferous rocks of the secondary epoch, and extends over a very considerable portion of the south-eastern part of England. It lies beneath the tertiary deposits, and above the wealden formation, which rests on the oolite. Its normal position is represented in this diagram :—



* See the *Pharmaceutical Journal*, vol. viii, p. 229, November, 1848.

But its actual position is somewhat different to this. Suppose that the strata were elevated by some force acting upwards in the direction of the arrow at *B*, and that a corresponding subsidence took place in the direction of the arrow at *A*, the strata would then have the inclinations represented in the following ideal section, sketched by Dr. Mantell :—



Under the name of *chalk formation*, or *cretaceous system*, the geologist associates together various rocks, which differ very considerably both in a physical and chemical point of view. But they agree in the nature of their organic remains, were formed apparently under more or less analogous circumstances, and though not absolutely agreeing in age, are referable to the same geological epoch. They obviously, therefore, may be considered as belonging to the same family, and have received their common name (*chalk* or *cretaceous*) from the name of the most important member of the family.

The chalk formation includes the following rocks, enumerating them from above downwards :—

1. *Chalk* ..... { *Upper chalk*, with flints. / *Lower chalk*, without flints.
2. *Firestone*... { *Chalk marl.* / *Upper green sand* or Glauconite.
3. *Galt*, or Folkestone marl.
4. *Greensand*, or Shanklin, or lower greensand.

The chalk used in pharmacy and medicine is, therefore, obtained from the upper strata of the chalk formation. That which is freest from flints and other obvious impurities is, of course, to be preferred. The London whiting works are supplied from the neighbourhood of Northfleet and Gravesend.

The most recent and accurate analysis of the white chalk of the southern part of England is that published not long since by Mr. Schweitzer—†

Carbonate of lime	98.57
" magnesia	0.38
Phosphate of lime	0.11
Protoxide of iron	0.08
" manganese.....	0.06
Alumina	0.16
Silica	0.64
Chalk of the Brighton Cliffs.....	100.00

† *Proceedings of the Chemical Society of London*, p. 29, April 5th, 1842.

This analysis is interesting and important as it demonstrates the presence of phosphate of lime. Long before the publication of this analysis no doubt could have existed of the presence of this salt, on account of the abundant animal remains found in chalk; but the chemical demonstration of its existence was very desirable. To it is probably in a great part owing the value and celebrity of the herbage of the South Downs for the feeding of cattle, and its presence in the deep well-water of the London basin, as shown by the analysis of Professor Graham, is now readily explained. Perhaps to the existence of this salt is to be referred the rapid growth of confervæ in this water, as noticed by the eminent Chemist whose name I have just mentioned.

There are no modern springs, rivers, or seas which hold sufficient chalk in solution to lend support to the hypothesis that these enormous chalk beds were once in chemical solution in water. We are compelled, therefore, to regard them as deposits from waters which formerly held them in mechanical suspension. But the question then arises whether they are deposits of inorganic matter with organic remains intermixed, or deposits altogether of organic origin? Careful investigation leads to the latter inference. Ehrenberg‡ discovered some years since, in the chalk of both Brighton and Gravesend numerous microscopic shells, and thence inferred the animal origin of this chalk; an inference supported by Mr. Schweitzer's analysis, and by Dr. Mantell's important and valuable paper "On the Fossil Remains of the Soft Parts of Foraminifera, discovered in the Chalk and Flint of the South-east of England," published in the *Philosophical Transactions*, for 1846.

Ehrenberg gives the following account of chalk. Many and probably all white chalk rocks, he says, are the produce of microscopic coral animalcules, which are mostly quite invisible to the naked eye, possessing calcareous shells of $\frac{1}{24}$th to $\frac{1}{288}$th of a line in magnitude, and of which much more than one million are preserved in each cubic inch, that is, much more than ten millions in one pound of chalk. The peculiar state of aggregation in white chalk does not arise from a precipitate of lime previously held in solution in the water of the sea, nor is it the result of the accumulation of the small animalcules, but it proceeds from a disintegration of the assembled microscopic organisms into much minuter inorganic calcareous particles, the reunion of which into regular, elliptical, granular laminæ, is caused by a peculiar crystalloid

‡ Ehrenberg, *Die Bildung d. europ. libysch. u. arab. Kreidefelsen u. d. Kreidenmergels.* (Nach Vortragen in d. Akademie d. Wissenschaften zu Berlin, vom 6 and 20 December, 1838, und vom 18 Feb. 1839) Berlin, 1839. Also Weaver, *Annals and Magazine of Natural History*, vol. vii, p. 296. 1841.

process, which may be compared to crystallization, but is of a coarser nature, and essentially different from it. The best writing chalk is that in which this process has been developed to the greatest extent.

Ehrenberg goes on to say that the extreme minuteness of the chalk animalcules is strikingly proved by this, that even in the finest levigated whiting, multitudes of them are still present, and may be applied without suffering change, to the most varied technical purposes. Thus in the chalk coating given to painted chambers, paper, or even glazed visiting cards (when not coated with white lead alone) may be seen a pretty mosaic of well preserved moss coral animalcules, but which are invisible to the naked eye.

The number of species of animalcules found by Ehrenberg in the chalk of Gravesend and Brighton, is as follows :—

	Species of Calcareous Polythalamia.	Species of Infusoria.	
		Siliceous in chalk.	Soft shelled in flints.
In chalk of Brighton ...	7	1	4
In chalk of Gravesend...	6	3	5

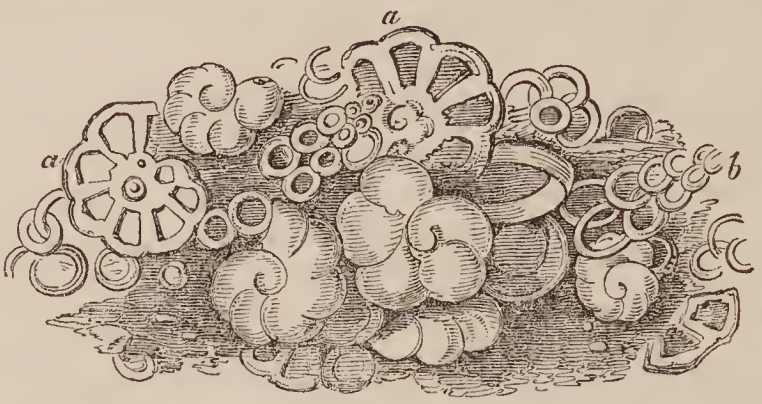
The following are the names of the species found in each kind of chalk :—

		Brighton.	Gravesend.
Polythalamia	Planulina	turgida	turgida
	Rosalina	O	globularis ?
	Rotalia	globulosa	globulosa
	Textularia	aciculata ?	O
	"	aspera	aspera
	"	globulosa	globulosa
	"	striata ?	striata
	Turbinalina	italica ?	O
Infusoria	Fragilaria	O	rhabdosoma
	"	O	striolata
	Pyxidicula	prisca ?	prisca
	Chaetotyphla	pyritæ	O
	Peridinium	pyrophorum	O
	Xanthidium	O	bulbosum
	"	furcatum	furcatum
	"	O	hirsatum
	"	ramosum	ramosum
	"	O	tubiferum

By submitting chalk and flint to a careful microscopic examination, Dr. Mantell observed not only the calcareous cases and shells of certain foraminated polythalamous cephalopods, but has even discovered the soft parts of these animalcules. He subjected a few grains of the cretaceous rock to the action of weak hydrochloric

acid, by which means the calcareous earth, and the shells it enveloped, were removed; the residue consisted of particles of quartz, and of green silicate of iron, with which the chlorite chalk abounds, and numerous remains of the soft parts of animalcules.

To the accuracy of the figure of the internal parts of a Rotalia, from the chalk published by Dr. Mantell (*Phil. Trans.* for 1846, plate xxi., fig. 10.), Dr. Pereira stated he could bear testimony, as, through the kindness of Dr. Mantell, he had examined the preparation by the microscope. The folds and duplicatures of the integuments of the digestive organs are beautifully displayed. Here is a drawing of *chalk dust* from Dr. Mantell's *Wonders of Geology.*



Chalk Dust, highly magnified, seen by reflected light.
a a. Rotaliæ. *b*. Textulariæ.

Dr. Pereira then proceeded to give a brief sketch of the mode of making whiting and prepared chalk.

Whiting is prepared by grinding the Northfleet chalk with water in a mill, and allowing the upper and finer portions of the mixture to run off into pits to settle. The wet deposited chalk, having the consistence of thin paste, is taken out of the pits in buckets, and placed by the hand in little heaps, on chalk stones, to dry. The form of the heaps is determined by the hand. When dry, the masses are called loaves, pigs, or lumps. The drying is effected in skeleton wooden houses, so constructed, as to allow the free circulation of air through them. The flooring of the drying-rooms consists of chalk stones, separated from each other by interspaces to admit of the circulation of air from floor to floor.

The *prepared chalk* is made from whiting, by grinding it with water into a paste, which is placed in little conical heaps on a stove to dry. The chalk is dropped on the stove by means of a machine having the shape of a triangular prism, and which may be called a compound syringe: that is, it may be compared to ten syringes placed side by side, and all the pistons moving together, so that the boys engaged in the preparation of the chalk, by elevating the compound piston, allow ten separate portions of the chalk paste to fall on the stove, and then by gradually lowering

the piston, the paste streams are tapered off so as to give a conical form to the loaves of chalk.

2. *Precipitated Carbonate of Lime.*—This is commonly called *precipitated chalk.* It is obtained by mixing together a solution of a calcareous salt (usually chloride of calcium) and a solution of an alkaline carbonate (generally carbonate of soda). Double decomposition ensues, an alkaline salt (chloride of sodium) remains in solution, and a crystalline carbonate of lime is precipitated—

$$Ca\,Cl + Na\,O,\,C\,O_2 = Ca\,O,\,C\,O_2 + Na\,Cl.$$

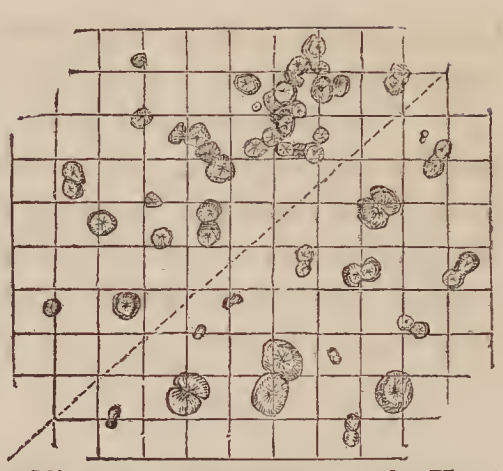
Dr. Pereira stated that he had procured precipitated carbonate of lime by both hot and cold and strong and weak solutions : the results were exhibited. Between the samples obtained at a boiling temperature, whether with strong or dilute solutions, and those procured at the ordinary temperature of the air, there was a manifest difference not only in the physical properties of the masses, but also in the microscopic characters of the particles. Dr. Pereira stated that he had reason to believe that his results confirmed Gustav Rose's statement, that when carbonate of lime is formed in the humid way, it has the properties of calcareous spar, if it be produced at a low temperature ; but that if it be formed at a high temperature, it possesses the properties of arragonite.

At any rate the small particles of precipitated carbonate formed in the cold were unaxial, and showed the black cross when examined by the polarizing microscope. It, therefore, appeared to belong to the calcareous spar variety of carbonate of lime. The precipitated carbonate of lime formed with boiling solutions, possessed double refracting power, but did not present the black cross. Dr. Pereira had not, however, been able to identify it absolutely with arragonite.

a. Precipitated carbonate of lime prepared with cold solutions. Hard and heavy precipitated carbonate of lime.—The carbonate of lime, prepared with either strong or dilute solutions, possessed the same general properties. Nor was any essential difference observed by substituting sesqui-carbonate of ammonia for carbonate of soda in its production.

Precipitated carbonate of lime prepared in the cold is, when dry, very different in its appearance to ordinary prepared chalk. The powder is much denser and harder to the feel than the other kind. A manufacturer of prepared chalk, to whom I showed it, thought that it was finely powdered marble. It does not soil the fingers when rubbed between them, as common whiting and chalk do ; and it has a more satiny and glistening appearance. From the samples which Dr. Pereira had obtained, it would appear that those formed with *weak* cold solutions were heavier than those prepared with *strong* cold solutions.

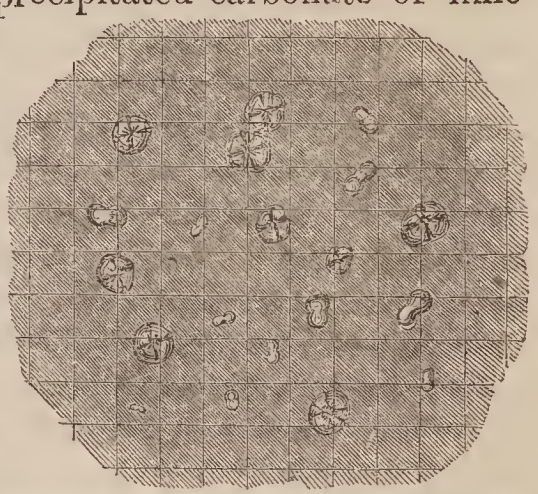
When submitted to microscopic examination this heavy precipitated carbonate of lime was found to agree very much in its properties with the heavy variety of carbonate of magnesia. It consisted of rounded or pearly particles, having a radiated structure, and in some cases being composed of concentric layers. In fact it was found to be identical in form with the *globular* or *pearl* carbonate of lime obtained from the urine of horses and bullocks. In one sample the globules are frequently united together in pairs, the double globule often presenting the dumb-bell shape observed in some specimens of the oxalate of lime deposited from urine.



Microscopic Characters of the Hard and Heavy precipitated Carbonate of Lime.

(The upper and smaller globules were obtained by the action of sesqui-carbonate of ammonia on chloride of calcium. The larger agglomerated and dumb-bell shaped particles were procured by the action of carbonate of soda on chloride of calcium.)

The globules or pearls of heavy precipitated carbonate of lime are brilliant objects when viewed by the polarizing microscope. They present the well-known black crosses and splendid colours in the quadrants. Unlike the globules of heavy carbonate of magnesia, the quadrants do not present uniform tints of colours; but coloured rings, like thin plates of calcareous spar.



Microscopic Appearance of the Globules of Heavy and Hard precipitated Carbonate of Lime when viewed by Polarized Light.

One sample of heavy precipitated carbonate of lime showed very obvious minute rhombohedric crystals. This specimen had been prepared from a weak, slightly acid, and ferruginous solution of chloride of calcium, and a weak solution of carbonate of soda.

β. *Precipitated carbonate of lime prepared with boiling solutions. Soft and light precipitated carbonate of lime.*—The properties of precipitated carbonate of lime, obtained from hot solutions, were similar, whether the solutions used were weak or strong.

In the mass, the precipitated carbonate thus obtained resembled common prepared chalk in its general appearance. It was soft to the feel, soiled the fingers like whiting and chalk, and had a dull dead-white appearance, without any of the satiny or glistening character observed in the former variety.

When submitted to microscopic examination, no globular or

pearl-like bodies were discoverable. The particles were very considerably smaller, and appeared like minute crystalline fragments, many of them having a linear, prismatic, or acicular form. When examined by the polarizing microscope, no crosses or rings were observed on them.

In conclusion, Dr. Pereira observed that in preparing the so-called *precipitated chalk* for pharmaceutical or medicinal purposes, hot or cold solutions should be used, according as a soft or hard product be required.

[The globules of the hard and dense precipitated carbonate of lime were exhibited after the meeting by the polarizing microscope. Specimens of polythalamous animals from the chalk were also shown by the common microscope]

ON LINIMENTUM SAPONIS.

BY MR. W. A. HALLOWS.

When recently making *linimentum saponis*, I could not help feeling surprised that the Pharmacopœia should for so many years have contained a formula for this preparation from which it cannot be made in the state in which it is required for use. Soap liniment or opodeldoc is always prescribed by medical men, under the impression of its being a liquid; and the public are so accustomed to use it in this form, that if it were offered them in the solid state, it would be rejected as useless, or inconvenient for application. Yet, when made according to the instructions of the Pharmacopœia, it becomes solid, and retains that condition in all states of the atmosphere. This fact has been noticed by some of the commentators on the Pharmacopœia, and has been alluded to on more than one occasion in the *Pharmaceutical Journal*. In bringing the subject before this meeting on the present occasion, my principal object has been to call the attention of the College of Physicians, who are said to be now engaged in preparing a new Pharmacopœia, to the defects in the formula alluded to. It is much to be regretted that any formula should be admitted into the Pharmacopœia without being previously tested by competent judges, for in a case like that under notice, when the product obtained in accordance with the prescribed instructions, is inapplicable for the purposes for which it is intended, the pharmacist has no alternative but to deviate from the instructions to such an extent as to fulfil the intentions of the prescribers. He is thus forced to break through what ought to be a rule of uniform obligation, namely, that all medicines used in dispensing, should be prepared faithfully according to the Pharmacopœia.

With the view of ascertaining what is the least amount of

deviation from the prescribed formula by which a fluid opodeldoc may be obtained, I made two or three experiments, of which the following are the results :—

1. In the first place, I prepared a specimen of soap liniment exactly according to the Pharmacopœia. The soap used in the process was the best white Marseilles soap, and to be satisfied that this agreed with the definition of "Sapo" in the Pharmacopœia, part of the specimen used has been subsequently examined, and found to be a pure soap made from oil and soda. The formula of the Pharmacopœia is as follows :—

"Take of Soap, ℥iij.
Camphor, ℥j.
Spirit of Rosemary, f ℥xvj.

Dissolve the camphor in the spirit ; afterwards add the soap, and macerate with a gentle heat until it is dissolved."

The product obtained by this process is a firm jelly, which cannot be poured out of a bottle without melting it by heat. A specimen of it, labelled No. 1, is placed on the table for comparison with other specimens about to be described.

2. The specimen No. 2 has been prepared by dissolving as much oil of rosemary as would be contained in spirit of rosemary made by distillation according to the Pharmacopœia, in thirteen ounces of rectified spirit, and to this one ounce of camphor was added. Then three ounces of soap, previously scraped, was melted in three ounces of water by the aid of a gentle heat, and mixed with the alcoholic solution. The only material deviation in this process consists in the substitution of three ounces of water for a similar quantity of spirit. It will be observed, however, that the soap is not kept perfectly in solution.

3. Another specimen, No. 3, was prepared in the same way as the last, but substituting four ounces of water for four ounces of the spirit, and this retains its fluid condition. The formula by which this is made will stand thus :—

Take of Soap, ℥iij.
Camphor, ℥j.
Rectified spirit, f ℥xij.
Oil of Rosemary, ♏xij.
Distilled water, f ℥iv.

Dissolve the camphor and oil of rosemary in the spirit, then dissolve the soap in the water with a gentle heat, and mix the two solutions.

I think it would be an improvement in the formula to increase the quantity of oil of rosemary to half a drachm or a drachm.

In the above process, I have used a solution of oil of rosemary in spirit for the spirit of rosemary of the Pharmacopœia. The College directs spirit of rosemary to be made by mixing together oil of rosemary, rectified spirit, and water, and then distilling off

a quantity equal to the spirit used. The product will, of course, consist of the spirit and the volatile oil, which pass over, leaving the water behind. Now, I would query whether this and some of the other spirits which are now directed to be made by distillation, would not for all practical purposes be as good if the essential oil was merely dissolved in the spirit and the distillation omitted. The only advantage that can result from distillation when essential oil is used, is that by this means any non-volatile constituent of the oil is rejected, and in the cases of those oils which become resinified by exposure to the air, the product may be somewhat more pure when distillation has been adopted; but oil of rosemary and oil of lavender do not become resinified to any appreciable extent, if carefully kept; and I am inclined to think that the spirits made from these oils are quite as good, and the process for making them is certainly much more simple and easy, when the oils, in the best state in which they can be met with in commerce, are merely dissolved in the spirit. Spirit of lavender is directed, in the Pharmacopœia, to be distilled from the lavender flowers, while spirit of cinnamon and spirit of rosemary are ordered to be made by distillation with the essential oils. I should conceive that spirit of cinnamon ought to be distilled directly from the cinnamon-bark, because the oil of cinnamon is very liable to become oxidized, and in this state it acquires very altered characters; but spirit of lavender would be generally better when made by dissolving the best commercial oil of lavender in spirit, than by distilling the flowers obtained from the herbalist. I am informed by a gentleman of considerable experience that the average quantity of essential oil of lavender, equivalent to two and a half pounds of the flowers (the quantity ordered in the formula of the Pharmacopœia for one gallon of the spirit) is ℥iij, grs. xxix. It would be a great advantage to those Pharmacists who are not provided with the arrangements for the distillation of spirits, or who are not allowed to conduct such processes by the regulations of the insurance offices, if they could make such preparations as compound tincture of lavender and compound camphor liniment, by mere admixture and solution of the ingredients.

Clark's Place, Islington.

Mr. Fordred inquired if Mr. Hallows had referred to some of the old Pharmacopœias for the formulæ originally given for the preparation of soap liniment and spirit of rosemary? He thought the spirit of rosemary was originally made with proof spirit, in which case the product would be different from that made according to the present Pharmacopœia.

Mr. Hallows said he was aware that spirit of rosemary was formerly made with proof spirit, but he conceived that the instruc-

tions of the present Pharmacopœia were those alone which the Pharmaceutical Chemist was under any obligation to observe.

Mr. Bell, although agreeing with Mr. Hallows, thought that a reference to the old Pharmacopœias would tend to explain the cause of the defect in the present formula for linimentum saponis. This formula was verbally the same as it had been from the commencement, and no fault had been found with the product until new editions of the Pharmacopœia were introduced. The fact was, that an alteration had been made in the process for making the spirit of rosemary, and in this, as in other cases, sufficient care had not been taken to study the influence of such alteration, not merely upon the preparation itself, but upon medicines into which it entered as a constituent.

HARTSHORN AND OIL.

Mr. Hallows said that, having understood that some observations on the preparation of linimentum ammoniæ were likely to be offered to the meeting, he had prepared a specimen of the compound, commonly called *Hartshorn and Oil*, according to a formula which he thought was a great improvement on that usually adopted. The formula is as follows:

Take of Distilled Water, f ℥iij.
Nut Oil, f ℥v.
Oil of Almonds, f ℥ij.
Strongest Liquor Ammoniæ, sp. gr. .882, f ℥j.

Put the water into a bottle and pour over it the oils, then add the liquor ammoniæ, and shake them well together.

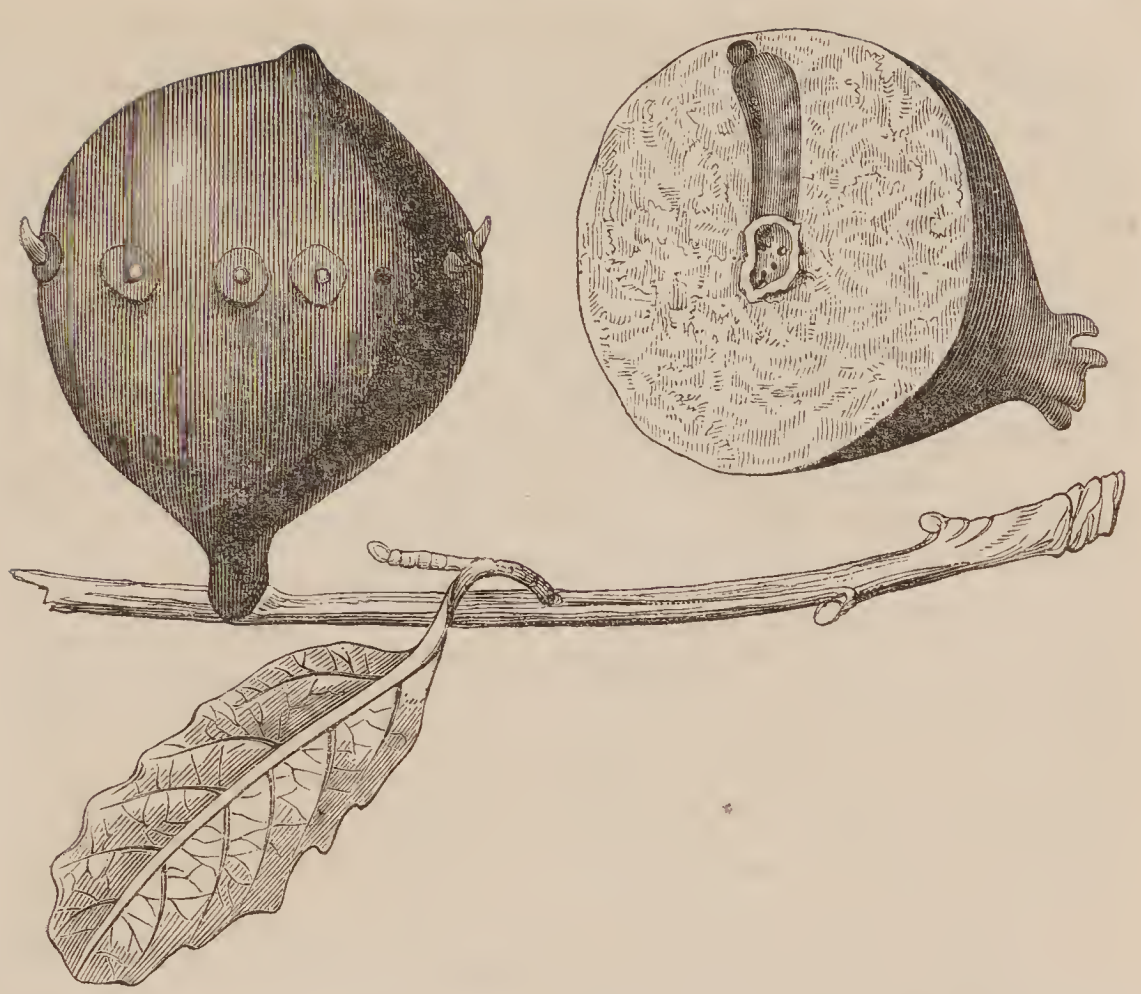
This mixture, if carefully prepared, will keep for a great length of time without any separation occuring.

The nut oil is kept by most of the Wholesale Druggists. It is obtained from the *ground nut* (*Arachis hypogæa.*)

MECCA OR BUSSORAH GALLS.

A specimen of galls, called *Mecca galls*, were presented to the Pharmaceutical Society by Mr. Luckombe, who informed Dr. Pereira that they were imported from Bussorah.

Dr. Pereira stated that these galls were identical with those described and figured in the 17th volume of the *Transactions of the Linnæan Society*, 1847, by the late Mr. A. B. Lambert, whose specimens were brought home by the Hon. Robert Curzon, from the Holy Land.



Branch bearing a Gall. Section of a Gall.

Mr. Curzon stated that the tree which produces them grows in abundance on the mountains in the neighbourhood of the Dead Sea, and is about the size of our apple tree. It is perhaps, the *Quercus foliis dentato-aculeatis* mentioned by Hasselquist as growing on Mount Tabor (*Trav.*, p. 281). The galls are described by Mr. Lambert as being pear-shaped, but some of those presented to the Society by Mr. Luckombe are round. Their size varies from that of a large hazel nut to that of a small apple. Towards the middle or upper part of the gall, are one or more circles of small protuberances, some sharp-pointed, others nipple-shaped. Mr. Lambert thought that these were formed by the gall-insect for air or defence, or some other purpose. In each of the larger galls, there is an aperture through which the insect escapes, and in the centre there is a small round hole or *nidus*, where it has lodged. The substance of the interior is soft, spongy, and friable. To the taste it is somewhat astringent, and scarcely bitter. Mr. Lambert describes his being "as bitter as gall." This is the only point in which the Mecca galls differ from those described by Mr. Lambert. Mr. Curzon informed Mr. Lambert that these galls, when on the tree, are of a rich purple, and varnished over with a soft substance of the consistence of honey, shining with a most brilliant lustre in

the sun, which makes the galls appear like a most delicious and tempting fruit. The dried specimens figured by Mr. Lambert are represented as being of rich or warm brown colour, and as if varnished. This agrees with the samples presented by Mr. Luckombe, some of which present the appearance of having been varnished, at least in parts.

Mr. Lambert states that he ascertained the leaves on Mr. Curzon's specimens were those of the *Quercus infectoria*, and that the galls are identical with those of commerce. The latter part of this statement, Dr. Pereira said, was certainly incorrect, the Mecca or Bussorah galls being very different from the nutgalls of commerce, and in fact, being at the present time unsaleable, which would not be the case with the genuine nutgalls. From information subsequently obtained by Dr. Pereira, it appears that two bags of these galls were imported among a parcel of 108 bags of the common nutgalls. Both bags were slightly damaged. Being unknown in the London market, they were bought in at 40*s.* per cwt., while the genuine nutgalls fetched 115*s.* per cwt. It is stated by the brokers, that the Bussorah galls are alone used in the country where they are produced, for dyeing, and that they are more estimated there than common nutgalls.

According to Mr. Lambert, these galls are the far-famed *mad apples* (*Mala insana*) or *apples of Sodom* (*Poma Sodomitica*) mentioned by Josephus and many other writers. In the *Book of Wisdom* (chap. x, verse 7) these apples are described as "fruit that never come to ripeness," and in various old authors we are told that the fruit, though beautiful to the eye, crumbles at the touch to dust and bitter ashes. Milton, in the tenth book of his *Paradise Lost*, compares the trees which resembled the forbidden tree of knowledge, as being

> ——————————"like that which grew,
> Near that bituminous lake where Sodom flamed."

Various opinions have been held respecting the nature of these apples. Hasselquist thought they were the fruit of *Solanum Melongena* (egg-plant nightshade, or mad-apple). Seetzen considered them to be the fruit of a species of cotton-tree, and Chateaubriand thinks that they are a fruit like the Egyptian lemon, with a blackish seed, but whose name he does not mention.

LIST OF MEMBERS,

ASSOCIATES, AND APPRENTICES (*continued*).

Elected in January and February.

MEMBERS.

Chipping Ongar .	Chapman, Richard I.
Huntingdon . .	Bentham, Isaac, High Street
Lewisham . . .	Clift, Edward, Lee Bridge
Thornbury . . .	Ellis, Richard, High Street
Woolwich . . .	Bishop, Thomas, Church Street
Yarmouth . . .	Barnard, Francis, Broad Row

MAJOR EXAMINATIONS.

Brown, Robert Thomas. . .	London
Furze, Henry	Richmond
Groves, Richard Henry. . .	Shepton Mallett
Robson, Joshua Hutchinson .	Norwich

MINOR EXAMINATIONS.

Bird, Augustus	London
Jones, John	Holywell
Sessions, Joseph J.	Cirencester

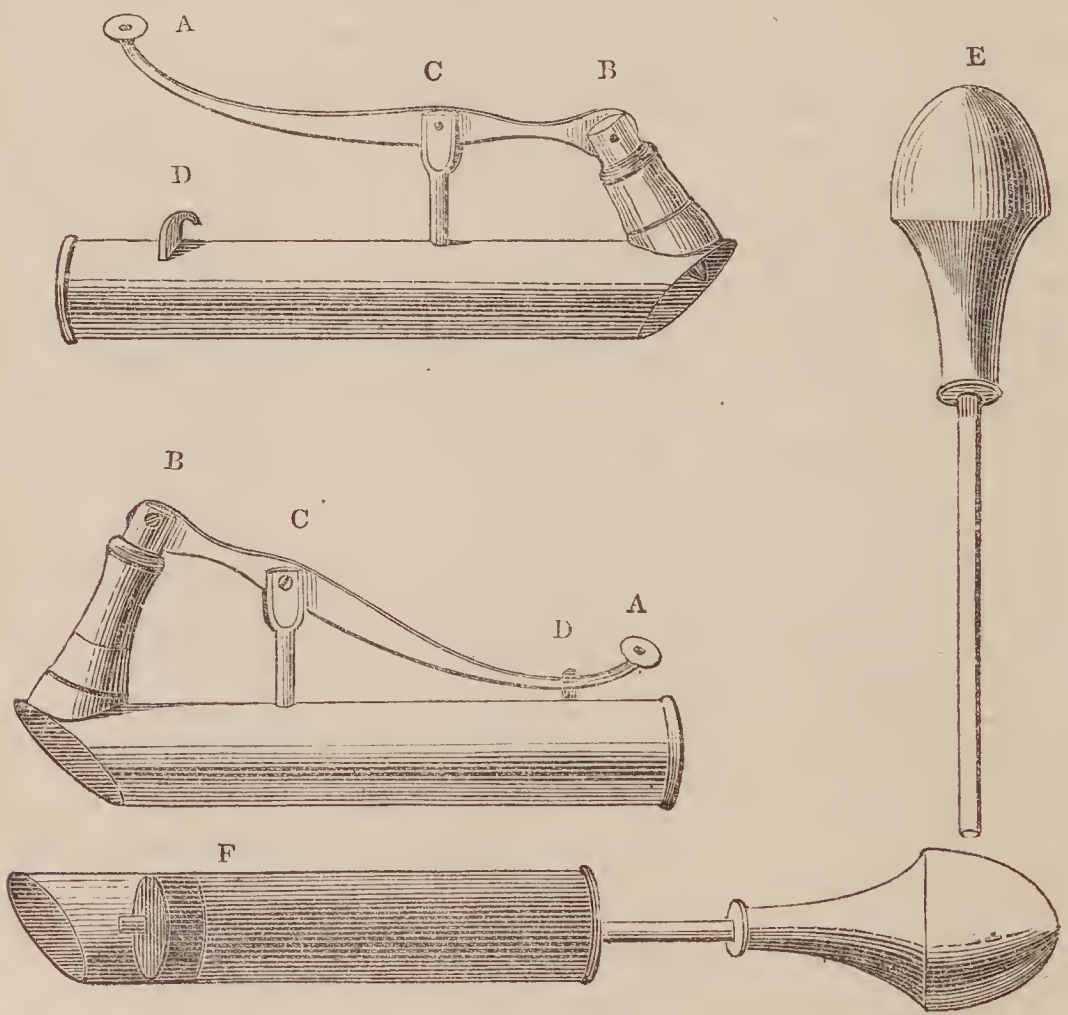
REGISTERED APPRENTICES.

APPRENTICES.	RESIDING WITH	TOWNS.
Ayres, Thomas. . .	Mr. Evans . . .	Hemel Hempstead
Boulding, Edward. .	Mr. Finch . . .	Swaffham
Bromley, William A. .	Mr. Garbutt . . .	Gateshead
Coppock, Henry J. .	Mr. Coppock. . .	Bridport
Douglas, Thomas . .	Mr. Willerton . .	Coventry
Haylock, Henry . .	Mr. Markland . .	Yarmouth
Hopwood, Thomas S. .	Mr. Hopwood . .	Richmond
Jones. John	Mr. Jones	Worksop
Keene, Edward . . .	Mr. Emlyn . . .	Guildford
Mills, William . . ,	Mr. Smallwood . ,	Macclesfield
Orton, Richard J. W. .	Mr. Noakes . . .	Brighton
Parkes, Thomas . .	Mr. Sylvester . .	Knutsford
Rixon, John B. . .	Mr. Gigner . . .	Chelsea
Smeeton.	Mr. Morris . . .	Birmingham
Tovey, Charles . . .	Mr. Witherington .	Worcester
Van, Arthur F. . .	Mr. Savage . . .	Brighton
Varness, Frederic . .	Mr. Hogg . . .	London
Vizer, Edwin B. . .	Mr. Taylor . . .	Ledbury
Walker, Charles . .	Mr. Walker . . .	Hogsthorpe
Weld, George H. . .	Mr. Corfield . . .	Camden Town
Williamson, David. .	Mr. Savage . . .	Brighton
Young, William F. .	Mr. Dakin . . .	Poplar

ORIGINAL AND EXTRACTED ARTICLES.

THE MECHANICAL LEECH.

At the request of several correspondents we give figures of this instrument, which in principle resembles a cupping apparatus on a small scale. A B is a lever moving on a pivot at C to raise or depress the scarificator, which is drawn towards the part affected by an Indian-rubber spring. E is a rod for depressing the piston, which is also fixed to a similar spring. F is one of the so-called leeches, which is applied after the scarification is made. In using the instrument—the lever at A is depressed and fixed by the hook D. The rod E being inserted to depress the piston, the instrument is applied to the part affected, which is previously moistened to promote adhesion. The lever being disengaged suddenly from the hook D, the scarificator descends with a jerk and makes the incision. F represents one of the glasses with the piston depressed, ready for application, which being done the spring raises the piston and forms the vacuum. The glass may be emptied and replaced several times on the same incision. The pistons should be kept well greased with lard so as to work freely, and the instrument should be carefully cleaned after being used. Each case contains utensils for this purpose.



CALIFORNIA.—THE PROPERTIES OF GOLD.

Leaving the ebullition of excitement respecting the treasures of California to the daily newspapers, we take the present occasion to give a few extracts on the properties of gold from Professor Anstey's *Gold-Seekers' Manual.*

In colour and lustre, inexperienced persons might mistake various substances for gold ; these are chiefly iron and copper pyrites, but from them it may be readily distinguished, being softer than steel and very malleable; whereas iron pyrites is harder than steel, and copper pyrites is not malleable ; for although the latter mineral yields easily to the point of a knife, it crumbles when we attempt to cut or hammer it; whereas gold may be separated in thin slices, or beaten out into thin plates by the hammer, There can thus be no possible difficulty in distinguishing these various minerals in a native state, even with nothing but an ordinary steel knife. From any other minerals, as mica, whose presence has also misled some persons, gold is easily known by very simple experiments with a pair of scales, or even by careful washing with water, for gold being much heavier than any other substance found with it (except platina and one or two extremely rare metals), will always fall first to the bottom, if shaken in water with mud, while mica will generally be the last material to fall. This is the case however fine or few the particles of either mineral may be.

Gold, therefore, can be distinguished by its relative weight or specific gravity, and by its relative hardness, from other bodies which resemble it. It is described generally as soft, completely malleable and flexible, but more accurately as softer than iron, copper, or silver, but harder than tin and lead. It is useful to know facts of this kind, as a simple experiment that can be made with instruments at hand, is often more valuable than a much more accurate examination requiring materials not immediately available. Thus if it is found that a specimen (perhaps a small scale or spangle) is readily scratched by silver, copper, or iron, and scratches tin and lead, it may, if of the right colour and sinking rapidly in water, be fairly assumed to be gold.

The weight of gold, as of all substances, it is convenient to estimate relatively, and in comparison with the weight of an equal volume of water. The relative weight, or *specific gravity*, as it is called, of gold is remarkably high, the lightest varieties being twelve times heavier than water, and pure gold nineteen times. This is expressed by saying that the specific gravity of native gold is 12—19, and the number determined by comparing the weight of the mineral in water and air.

As the value of gold depends almost entirely on its specific gravity, and this test, therefore, is of the greatest practical importance, it will not be out of place if we here explain some very simple apparatus for the determination of this point.

If the specimen then is large enough to be suspended conveniently by a thread, weigh it first in air by a fine balance, expressing the result in grains, and taking care previously to remove dust or loosely adhering particles. Then suspend it by a horsehair from the scale-pan (it is convenient to have a hook attached to it for this purpose) and thus suspended immerse it and re-weigh it in water, taking care that it is covered on all sides by at least half an inch of water, and carefully brushing off with a feather any bubbles of air that adhere to the surface. The results may then be noted as follows :

Weight of substance in the air in grains .....
Deduct weight of ditto in water .....

Difference .....

This result gives the weight of a bulk of water equal to that of the specimen, and by dividng the weight of the specimen in air by this number, the specific gravity is obtained.

$$\text{Specific gravity} = \frac{\text{weight of substance in air.}}{\text{weight of equal bulk of water.}}$$

If, however, the substance is in the form of fine sand or very small lumps, it is better, after weighing it carefully, to take a small dry phial furnished with a stopper; counterpoise this phial accurately in the weight-scale by shot or strips of lead, then fill it completely with pure water, taking care that no bubbles of air are left in, and weigh the quantity of water it contains: afterwards empty the bottle and dry it inside.

Next fill the bottle about two-thirds full of the powder to be examined, weigh this, and record the weight. Then fill the bottle once more with water, taking care, as before, that all bubbles are expelled and none of the powder washed out. Once more weigh it.

We have then to make the following calculation:

Weight of powder and water in grains ..... =
Deduct weight of powder alone ..... =

Difference (weight of water left in bottle) =

Weight of bottle full of water in grains..... =
Weight of water left in bottle..... =

Difference (weight of water displaced by, and equal in bulk to, powder) =

$$\text{The specific gravity} = \frac{\text{weight of powder in air.}}{\text{weight of water displaced.}}$$

It may be useful to know the specific gravity of various substances at all resembling gold either in weight or appearance, and we therefore append the following short table. The specific gravity of water is assumed to be unity:—

Osmium	$21\frac{1}{5}$		Silver	10	
Platinum.....	$19\frac{1}{2}$—22	not hammered*.	Copper	$7\frac{3}{4}$—8	
Iridium	$18\frac{7}{10}$		Brass	$8\frac{1}{2}$	
Gold.....	$15\frac{3}{4}$—$19\frac{1}{4}$	ditto	Lead ore (galena).....	$7\frac{1}{2}$	
Mercury	$13\frac{1}{2}$		Copper pyrites	5	
Palladium ...	$11\frac{7}{10}$		Iron pyrites	4	
Lead	$11\frac{1}{4}$		Diamond	$3\frac{1}{2}$	
Rhodium	$10\frac{3}{5}$		Sand	$2\frac{3}{5}$—3	

By the help of this table the value of auriferous sand may also be in some degree estimated, since, as will be seen, the specific gravity of most of the sands is under 3, while that of the most impure gold is 12; so that if the specific gravity of the sands themselves, when experimented on, is much greater than that of ordinary sand, it is likely that the excess will be for the most part gold in a district otherwise known to be auriferous: the greater the specific gravity, too, the greater probability there is of this being the cause.

The form in which gold is found is various. It is sometimes crystalline,

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* Metals, when hammered, become much more compact and have therefore a higher specific gravity.

in eight or twelve-sided regular figures, passing into cubes, but the crystals are generally small and rare. In case of such crystals being found, it is well worth knowing, that they possess a value as mineral specimens far beyond that of the gold which they contain.

The gold from California, according to the assay of Mr. Warwick of New York, yields 89.58 per cent. pure gold, and is, therefore, about equal to that obtained from the washings of Miask (the richest district in Western Siberia, and that producing the largest pepipas), and superior, as the assayer remarks, to the gold dust from Senegal.

The method of blow-pipe analysis, although exceedingly useful, is not absolutely necessary in the case of gold, because of the many readier ways of determining the metal, but it seems advisable to state the appearances presented. All the varieties are readily fusible into a globule, which, when the gold is pure, is unaltered by the continuance of the heat. In this respect it differs entirely from iron and copper pyrites, which, on being exposed to the flame, give off sulphur fumes and undergo considerable change. In the case of gold containing other metals, these, with the exception of silver, may generally be got rid of by continuing the heat in the exterior flame with the addition of a little nitre. Before the oxy-hydrogen blowpipe, the metal is volatilized in the form of a purple oxide.

Gold is not acted on by any of the acids alone. When exposed to the mixture of nitric with hydrochloric acid (in the proportion of one part nitric to four of hydrochloric) called *aqua regia*, it dissolves without residue, the solution giving a purple precipitate with protochloride of tin, and a brown precipitate with protosulphate of iron.

The following simple mode of detecting attempts at imposition in gold-dust is worthy of being recorded in this place.

Place a little gold-dust in a glass tube or earthenware saucer, and pour nitric acid upon it ; then hold the glass or saucer over a flame, or upon a few embers, until red fumes (nitric vapours) arise ; if it be pure gold, the liquid will not become discoloured ; but if pyrites or brass-filings should have been mixed with it, the acid will become turbid, green and black, discharging bubbles of gas. After the ebullition has ceased, the residue should be washed with water, and acid again poured upon it, when the same effect may be observed, but in a less degree ; and if the experiment be repeated till all effervescence ceases, it will finally leave the gold-dust pure.

ON THE ERRORS RESULTING FROM THE DETERMINATION OF THE SPECIFIC GRAVITIES OF BODIES WHEN IN A FINELY DIVIDED STATE.

BY PROFESSOR G. ROSE.

The author found on repeating the determination of the specific gravity of some of the metals, that the results varied according to the state of division of the substance operated upon. This was the case with gold and silver, and similar results were obtained with platinum and sulphate of baryta.

Specific Gravity of fused Gold.—These determinations are accompanied with great difficulties, as it is scarcely possible to obtain the gold in a suitable state. Native gold always contains silver, with slight traces of iron and copper, and in the larger masses of native gold, quartz and brown iron ore are frequently enclosed. The purified gold, fused in crucibles, is always full of smaller or larger cavities, whether melted alone or beneath layers of borax, carbonate of soda, or chloride of sodium. When melted alone, a large hole is found on the under surface if it solidified quickly,

because fused gold occupies a much larger space than the solidified. Such a cavity frequently extends far beneath the surface, and in such case it is impossible to expel all the air. Moreover, the metal appears covered on the surface by frequent rows of very minute crystals, which intersect at an angle of 60°, and leave minute cavities between one another. If the fused gold is allowed to cool slowly, for instance, when melted in a porcelain furnace, its surface is found to be still more distinctly crystalline. If fused under a stratum, the surface is, it is true, smooth and bright ; but in this case deep cavities occur, which are filled with the flux. All these errors could only be avoided by determining the specific gravity of the metal, and of other metallic alloys, after they had been passed through the pressing machine of the Mint.

At a temperature of 14° R., the author obtained the following numbers in his new experiments. Gold, fused in a clay crucible with borax and nitre, possessed a specific gravity of 19.2089 ; after it had been pressed, 19.3202 ; after being fused again in a black-lead crucible, 19.2908 ; and after repeated pressure, 19.3296. Since Marchand and Scheerer found that copper fused under a stratum of chloride of sodium possessed a higher specific gravity than when fused under other strata, a regulus was fused under a layer of chloride of sodium. Its specific gravity was 19.2722 ; after pressure, 19.2992 ; after fusion in a black-lead crucible, 19.2955 ; and after being pressed again, 19.3087. Gold, reduced by means of oxalic acid and fused in a black-lead crucible, had a specific gravity of 19.2981 ; and after pressure, 19.3336. The fusion of gold under a layer of chloride of sodium did not afford the means therefore of obtaining gold of greater density ; as it likewise remained lower after pressure, it appears as if the gold enclosed particles of chloride of sodium. Apparently that gold has the highest specific gravity which has been melted of itself in a black-lead crucible, and submitted to pressure. The author consequently assumes preliminarily 19.3336 as the specific gravity of gold at 14° R.

Specific Gravity of Silver.—Native silver cannot be employed to determine the specific gravity, because it is never pure ; and that which has been purified cannot be melted alone for this purpose, because on cooling, a portion is projected, and it puffs up more or less. The determinations made by Bresson are for this reason too low. In his former experiments, the author weighed the regulus obtained on reducing the chloride, which answers very well. The earlier results with three different samples were, —I. 10.5041, II. 10.4991, III. 10.5036. In his recent experiments, the regulus II. was fused in a clay crucible beneath a stratum of common salt. The regulus obtained was smooth on the upper surface, but reticulate on the lower one, and was consequently filed away at this place. Its specific gravity agreed with the results of the former experiments, being 10.5050 at 14° R.

Specific Gravity of Gold in the State of Powder.—Gold precipitated by protosulphate of iron from dilute solutions appears amorphous under a high magnifying power, on account of its minute state of division. From concentrated solutions it is precipitated in microscopic cubes. Gold reduced by oxalic acid appears in more distinct crystals ; they are octahedrons. The metallic film deposited on the sides of the vessel in which the reduction is made, consists entirely of such crystals. The results given below exhibit great differences, which can however only be ascribed to the nature of the precipitate, as several samples of the same precipitate afforded results which agreed with each other. The highest specific gravity was found in the finely-divided precipitates ; for the larger the precipitated particles are, the lower the specific gravity. The specific gravity of gold, as precipitated by sulphate of iron, was found to be at 14° R. 19.5701, 19.7447, 19.8150, 20.6882, 20.2634. That precipitated

with oxalic acid weighed likewise at 14° R. 19.4791 ; gold filings afforded at 16°.9 R. yielded the low specific gravity of 19.2178. Little globules, of about the size of a pin's head, fused before the blowpipe, likewise gave only 19.2721 at 18°.2 R. It is of no great consequence whether the surface of the metallic particles had been dried before immersing them in the water, as they are completely moistened when boiled with water. The precipitate which had given the above specific gravity of 19.5701 yielded, after drying and subsequent boiling with water, 19.5622 ; the dried precipitate, when pressed, possessed the specific gravity of 18.0194 only.

Specific Gravity of Silver in the State of Powder.—The silver employed by the author was precipitated from a solution of the nitrate by protosulphate of iron. The precipitate consisted of microscopic crystals, which were in general larger than in the case of the gold ; they are octahedrons with truncated edges ; they afforded at 14° the numbers 10.5485 and 10.6139. In this case also the lowest specific gravity was possessed by the coarsest precipitate.

Specific Gravity of Platinum in a State of Powder.—This is stated by Playfair and Joule to be 17.890. Liebig gives that of platinum-black at 17572, 17.580, 16.1319. Platinum-black, prepared by Mitscherlich by precipitating chloride of platinum with carbonate of soda and sugar, and which appeared amorphous under the highest magnifying power, had the high specific gravity of 26.1418 at 14° ; while that of platinum-foil, according to various determinations, is situated between 21 and 22.

Specific Gravity of Native Sulphate of Baryta.—The specific gravity of a crystal from Silbach, in Westphalia, was 4.4875 ; another crystal, from the same locality, 4.4855 ; a crystal from Przibram, 4.4808 ; a crystal from Champeix in Auvergne, 4.4798 ; several fragments from the same locality, 4.4808 ; the largest of the latter, 4.4776 at 14° R. The heavy spar at Silbach afforded, according to an analysis made by Rammelsberg, 99.40 per cent. pure sulphate of baryta. The specific gravity of the sulphate of baryta, precipitated from the chloride by sulphuric acid, and which consisted of microscopic prisms, amounted at 14° R. to 4.5209 and 4.5350. Finely-pulverized native heavy spar from Champeix possessed a specific gravity of 4.48447 ; some from Dufton, 4.8027 ; both powders appeared very coarse under the microscope, in comparison with the precipitated salt.

Conclusions.—1. Determinations of the specific gravity of substances, obtained in a finely-divided state by precipitation, generally come out higher than when large crystals or solid masses are weighed. 2. In the first of these cases, the specific gravity increases with the greater state of division of the precipitate. The reason of this is, that the increased surface of the body condenses more water upon it than upon a smaller one, precisely in the same manner as solid bodies act towards gases ; consequently it is not only the body which is weighed in water, but at the same time also a surrounding stratum of denser water ; and in this manner too low a number is obtained for the loss in water, which, on division into the absolute weight of the body, affords too high a result. Even though the water is but slightly compressible, yet to this circumstance must be opposed the very considerable power of condensation of finely-divided bodies, which is certainly great in specifically heavy bodies, bearing in mind that box-charcoal absorbs thirty-five times its volume of carbonic acid. Since the precipitated metals possess the same crystalline form as when fused, at least in the case of gold and silver, the higher specific gravity cannot be owing to the matter of the precipitated metal, and must consequently rather be sought for in the above causes. In the case of the sulphate of baryta the result is not quite so decisive, although even here the precipitated salt has a higher specific gravity, because it could not be determined whether the crystals of the precipitated salt were of the same

form as the native. But that the gold filings and the pulverized heavy spar had not a higher specific gravity, is probably owing to its being impossible to accomplish by mechanical means the requisite degree of division. To obviate the mischievous influence of cavities which occur in native minerals, it has become, since Beudant, generally the custom to use the powdered mineral for determining the specific gravity. According to the above experiments, there is no objection to this, as the state of pulverized substances can have but little influence on the specific gravity. The determinations in the case of chemical precipitates, which give erroneous results, are, from its being frequently impossible to obtain pure substances in any other manner than by precipitation from a solution, so important, that the discovery of an accurate method for the determination of their specific gravities would be of great value.—*Poggendorff's Annalen, and Chem. Gaz.*

ON THE USE OF CHLORIDE OF GOLD IN DETERMINING THE PRESENCE OF ORGANIC MATTER IN SOLUTION IN ORDINARY WATERS.

BY ALPH. DUPASQUIER.

The water of rivers, springs, wells, &c., all contain more or less organic matter in solution. When the quantity of this matter is very small, which is most frequently the case, its presence is unimportant, both as regards its use for domestic purposes, and as applied to the arts. In this case, the small quantity present may be considered as representing a normal state of the water, the quantity being so small that it is only taken into account in a qualitative examination of the water.

But common waters are frequently found to contain organic matter to an extent which may be represented as abnormal, and, in these cases, they are sometimes rendered unfit for use. It is therefore of some importance to ascertain, by means of a simple and easy process, the presence of organic matter in water, when it exists in more than usual proportion. In numerous experiments on drinkable waters, I have found, that testing by nitrate of silver gives but uncertain and false results. As regards the evaporation to dryness, and the calcination of the residue, which becomes blackish when the organic matter is in some quantity, it is a long process, and the results but unsatisfactory.

After having tried without success various chemical processes to detect the presence of this abnormal proportion of organic matter in waters, I found that the use of chloride of gold answered the purpose most efficiently, giving results which may be considered as decisive and certain.

The employment of chloride of gold suggested itself to me from the remarks made by persons engaged in the Daguerreotype process, and communicated to me by M. Glenard, to the effect that chloride of gold was decomposed when water condensed in steam engines, or other distilled water containing organic matter, was used for its solution.

The following is the process by means of which I ascertain the abnormal proportion of organic matter contained in the water. An ounce or two of the water to be examined, is to be poured into a small flask, and a few drops of solution of chloride of gold added, sufficient to colour it slightly yellow, the liquid is then to be boiled. If the water contains but the quantity of organic matter usually present in drinkable waters, it will retain the yellow colour, which remains pure, even during prolonged ebullition. If, on the contrary, the water should contain an abnormal proportion of organic matter, it will, in the first instance become brownish, and afterwards assume a violet or bluish tint, which arises from the decomposition of the salts of gold by the organic matter.

If the proportion of organic matter be large, the violet or bluish tint becomes more decided on prolonged ebullition ; but a slight brownish or greenish coloration of the liquid proves only that the organic matter exists in larger proportions than is usual.

In making these experiments with the chloride of gold, it is most essential to use a solution of this salt without an excess of hydrochloric acid, as I have ascertained that the latter counteracts the decomposing action of the organic matter.

Frequently, during a prolonged ebullition of the water coloured by the metallic chloride, oxide of gold is precipitated, owing to the action of carbonate of lime on this salt. In this case, if there is not much chloride of gold present, the liquid may become colourless, or if the proportion contained be large, the yellowish tints may be modified by a slight turbidity of the liquid. In order to distinguish these effects from the decomposing re-action produced by the organic matter, one or two drops of pure hydrochloric acid may be added, which will immediately dissolve the oxide of gold, and the liquid will then re-assume its original appearance, *if there has been no decomposition of the pure salts by the organic matter.* But if the chloride of gold has been brought to the metallic state under the influence of the organic matter, it does not dissolve in hydrochloric acid, as does the oxide, and the liquid remains of a violet, bluish violet, brownish violet, or greenish colour, when there is rather a large excess of chloride of gold. Notwithstanding, if the water contains a trace of a nitrate, and is re-boiled, the gold may then be dissolved.

This process has been objected to by some, on the ground that all organic matters have not an equal decomposing action on the salt of gold. But this objection is of no importance, when it is considered that it relates only to the organic matter contained in natural waters, which is always of the nature of *ulmine* or *geine*, and evidently results from the washing of vegetable or animal matter in a more or less advanced stage of decomposition, and most frequently in the state of mould, which exists in the earth through which the rain water filters, or in the soil of towns watered by rivers which supply their wells and fountains.

Under all these circumstances, the water contains organic matter of a similar nature, resulting from infiltration, and this exerts a marked decomposing influence on the salt of gold.

I have made numerous experiments with distilled water, to which I added either some recent urine, some gelatine, some crumb of bread, or any organic matter unaltered by putrefaction. These substances generally decompose the salt of gold, but most frequently after very prolonged ebullition. I have also boiled a small quantity of peat in the distilled water, and in another experiment, a small portion of vegetable earth, the liquid when filtered, then treated by the chloride of gold, rapidly became of a violet or bluish colour.

These comparative experiments have thus shown that the chloride of gold may be decomposed by unaltered organic matters, but in general more difficultly than by those which result from spontaneous decomposition of animal or vegetable remains, and consequently analogous to the organic matter held in solution in natural or common waters.—*Journ. de Pharm.*

ANALYSIS OF THE WATER AND MUD OF THE SERPENTINE IN HYDE PARK.

The attention of the public has recently been directed to the impure state of the water forming the lake, or so-called river Serpentine, in Hyde Park. This large body of water, to which hundreds of men and

boys daily resort throughout the summer months to cool their feverish skins, has for several years past been allowed to become a stagnant pond. The loss by evaporation from so large a surface of water has been supplied partly by springs in the bed of the river, and partly by the contents of certain sewers which have been made to empty themselves here, to refresh with their exhalations the crowd of smoke-dried citizens who throng the fashionable promenades and drives which surround it. The following analyses of the water and mud of the Serpentine were made by Mr. Thomas Savory, in the laboratory of the Pharmaceutical Society, at the request of Dr. Tilt, who has taken an active part in the measures which have been adopted in reference to this public nuisance. The character of the water will be best appreciated by comparing the analysis with that of the waters of other rivers, of which several will be found in a table at page 77 of this vol.

"*Examination of the Water and Mud of the Serpentine.*

Three specimens of the water were obtained, from different parts of the river, in the month of December, and after continued rains. The imperial gallon, or 70,000 grains of each specimen, carefully evaporated to dryness, afforded of solid residue, dried at 300° Fahr., as follows .—

No. 1	22.30 grains.
No. 2	25.35 "
No. 3	27.00 "

In each case, the water when much concentrated, assumed a thick, greenish-yellow appearance, and emitted an offensive smell. The smell of one of the specimens resembled that of a cesspool. The solid residue in each case, was of a greenish-yellow colour. The specimen No. 1 was submitted to analysis, and yielded—

Substances found.	Grains in Imperial gallon.
Silica	.590000
Carbonate of lime	.603128
" " magnesia	.709279
" " soda	6.045783
Chloride of sodium	5.180700
Sulphate of soda	2.097250
Phosphates of lime and iron	2.100000
Organic matter	4.973860
	22.300000

A specimen of the mud taken from one of the banks of the river was dried by the heat of a water-bath, and submitted to analysis. It was found to contain—

	Grains.
Insoluble silicates	75.2
Carbonate of lime	2.02
Peroxide of iron	7.89
Sulphate of soda	2.08
" lime	2.06
Alumina	a trace
Organic matter, containing .44 of sulphur, and .742 of nitrogen, equivalent to .902 of ammonia	9.25
	98.50

In the decomposition which the organic matter would undergo, in contact with atmospheric air and water, the sulphur above indicated would be converted into sulphuretted hydrogen and other volatile sulphur compounds, and the nitrogen into ammonia, forming, at times, hydrosulphuret of ammonia, the product of privies and of cesspools."

ON THE PREPARATION OF BISULPHURET OF CARBON.

BY M. CHANDELON.

The numerous applications which have recently been made of bisulphuret of carbon have rendered it important to ascertain the best method of preparing this compound abundantly and economically. The apparatus used for this purpose consists of a cylinder of cast iron, eight inches in diameter and twenty-eight inches long. This cylinder is permanently closed at one end, and furnished with a cover, which is screwed on at the other end. Through the latter an iron tube, two inches in diameter, passes to near the bottom of the cylinder : this tube is furnished with an iron stopper at its upper extremity. There is also a wide tube connecting the top of the cylinder with a suitable refrigerator, and the lower end of the condensing tube of the refrigerator is inserted into the mouth of a bottle containing some water.

The iron cylinder is filled with wood charcoal, and is then placed in a suitable furnace ; when it has acquired a dull red heat some pieces of sulphur are introduced through the tube, which is then immediately closed with the stopper. The sulphur is converted into vapour, which passing over the red-hot charcoal, combines to form the bisulphuret of carbon, and this is condensed in the refrigerator and collected in the bottle of water. With six pounds of charcoal and twenty or thirty pounds of roll sulphur, ten pints of the crude bisulphuret may be made in the course of six or seven hours.—*Journal de Pharmacie.*

ADULTERATION OF CREAM OF TARTAR.

BY MR. JAMES GRANT.

I beg, through the medium of the *Pharmaceutical Journal*, to call the attention of the Chemists and Druggists to the adulteration of powdered cream of tartar, as it is, I believe, one of those articles which from its cheapness, &c. is generally supposed not to be worth sophisticating. A specimen obtained from one of the most respectable wholesale Druggists in London yielded, in 100 grains, $8\frac{1}{2}$ grains of sulphate of lime (gypsum).

As cream of tartar is the source to which the Chemical student is generally referred for pure carbonate of potash, the exposure of this fraud becomes doubly important.

Bristol, Feb. 12, 1849.

COLLODION AS A COATING FOR PILLS.

BY MR. E. H. DURDEN.

I find that collodion may be usefully employed for coating pills, for this purpose the pills may be placed on the point of a fine pin or needle, and dipped into the solution of gun cotton. The solution I

used had a sp. gr. of 0.810, and I found two dippings gave a perfect coating. An aloetic or colocynth pill thus covered may be placed on the tongue, and no taste experienced of the bitter ingredients entering into its composition. Its medicinal effect is not interfered with. Solutions of gutta percha in chloroform, and bisulphuret of carbon effects the same purpose, but the collodion is preferable.

Dublin, Feb. 10, 1849.

DECOLORIZATION OF SUGAR.

Specification of Patent of Johann Arnold Steinkamp, of Leicester Square, Leicester Street, in the County of Middlesex, Gentleman, for Improvement in the Manufacture of Sugar from the Cane, and in Refining Raw Sugar. Dated 18*th July*, 1848.

Now know ye, that in compliance with the said proviso, I, the said Johann Arnold Steinkamp, do hereby declare the nature of my said invention, and the mode of carrying it into effect, of improvements in the manufacture of sugar from the cane, and in refining raw sugar, to consist in clarifying and purifying the juice of the sugar-cane, as well as raw sugar, by means of raw cotton and other vegetable fibres, cut up or otherwise divided into small lengths, varying from about an eighth to a quarter of an inch long.

The external gloss on the raw cotton is destroyed by pouring hot water upon it, turning it about, and thoroughly wetting it, allowing it to remain in the water about twelve hours ; it is then ready for use.

The apparatus required is a vessel (which I prefer to be rather wider in the top) ; a cock is placed just above the bottom to draw off the liquid ; above this there is a wooden frame crossed by thin strips of wood, over which a coarse cloth is stretched. In order to clean 100 pounds of raw sugar, two to two and a half pounds of raw cotton is required, which having been prepared as before described, when taken from the water and pressed by the hand, will weigh about six or seven pounds.

In order to clean a certain quantity of sugar, the requisite weight of prepared cotton is placed in the filter, and as much water is poured therein as will distribute it smoothly and equally in the water. The water is let out of the filter by opening the cock, and the cotton will fall into its proper position.

Upon this cotton a coarse cloth is laid, upon which is laid a frame crossed by thin strips of wood, which is to be so formed that when required it may be pressed down upon the cotton.

For the refining of raw sugar, to every thousand pounds weight of sugar I add five hundred to six hundred pounds of water, one to two pounds of chalk in powder, and half a pound of starch (the starch not being absolutely necessary, but appears to have a beneficial effect).

The sugar is then heated until it boils, and kept boiling from eight to ten minutes ; during the time to be well stirred, and the scum or froth skimmed off. The liquor is then allowed to pass through a sieve for the purpose of separating the liquor from the coarse impurities. The pouring in of the sugar will drive the water out of the prepared cotton, which will run off by the cock. This water is to be preserved, so that at the termination of the filtration it may again be poured upon the cotton.

If the sugar should run off too quickly, the cotton is to be lightly pressed down, which operation newly-prepared cotton will generally require, as it is very elastic and spongy, but when it has been in use a few times it loses this character.

As soon as the sugar has passed through the filter, it possesses a very

pure and sweet taste, and may now be boiled down to the point of crystallization, as the substances made use of in this cleansing, clearing, or refining of the raw sugar are perfectly neutral with respect to it. Less uncrystallizable sugar is produced, and as sugar so treated has a very strong tendency to crystallize, great attention must be paid to the boiling and claying processes.

By pouring water into the filter, it can be perfectly cleared off the sugar, while the impurities remain fixed in the cotton, and this will be evident by merely taking the cotton out of the filter and washing it. After it has been perfectly cleansed and washed, it may be used again.

I may observe the cotton may be mixed and even boiled with the sugar, and afterwards poured into the filtering vessel, and the liquor made to pass through the cotton, in place of the cotton being first put into the filtering vessel as above explained.

I employ the same means as those before described, for clarifying raw sugar, for cleansing the sugar-cane juice in the colonies, whether the juice be cleared by means of caustic lime, and afterwards through the cotton as before described, or better following my process, having the chalk mixed with the juice of the cane, quickly boiled up, and kept at the boiling point for some time, skimming the impurities as they arise, and then filtered through my cotton filter ; then for the most part, the fermentation and decomposition of the sugar will be prevented, as at the boiling point no fermentation can arise (similar to the wort of beer) and the acids which are in the sugar are absorbed or neutralized by the chalk.

An overplus or surplusage of chalk is perfectly harmless by the filtering through the cotton, the chalk together with all azotic and extraneous substances are quickly removed. By this process, the greatest possible produce in sugar will be gained, and the colouring product (the result for the most part of the decomposition of the sugar) will be avoided, and thus its quantity and quality will be increased and ameliorated—in place of cotton, or in combination with cotton, other vegetable fibres may be similarly employed.

That which I claim as my invention, is the use of cotton or vegetable fibre, cut up or divided into small lengths (preferring cotton to other vegetable materials), in the clearing, purification, and refining raw sugar as before described. In witness whereof, I the said, &c., &c., &c.

ON THE ACTION OF CHLOROFORM ON THE SENSITIVE PLANT (*MIMOSA PUDICA.*)

BY PROFESSOR MARCET, OF GENEVA.

When one or two drops of pure chloroform are placed on the top of the common petiole of a leaf of the sensitive plant, this petiole is seen almost immediately to droop, and an instant after the folioles close successively pair by pair, beginning with those which are situated at the extremity of each branch.* At the end of two or three minutes, sometimes more, according as the plant is more or less sensitive, most of the leaves next to the chloroformed leaf and situated beneath it on the same stalk, droop one after another, and their folioles contract, although generally in a less complete manner than those of the leaf placed in immediate contact with the chloroform. After a rather long time, varying according to the vigour of the plant, the leaves open again by degrees ; but on trying to irritate them by the touch, it is seen that they have become nearly insensible to this kind of excitement, and no longer close as before. They thus remain

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* I previously convinced myself by experiment that a drop of water, placed delicately on a leaf of the sensitive plant, caused no movement.

as if torpid for some time, and generally do not recover their primitive sensitiveness till after some hours. If, however, when they are in this state of apparent torpidity, they are subjected again to the action of the chloroform, they close as they did the first time. It is not till after they have been chloroformed several times, that they lose all kind of sensitiveness, at least until the next day ; sometimes they even fade completely at the end of too frequent repetitions of the experiment. In all cases the effects observed are the more marked in proportion to the purity of the chloroform employed and the degree of sensitiveness in the plant.

An analogous phenomenon is produced if, instead of placing the drop of chloroform on the base of the petiole, it is laid on the folioles situated at the extremity of a branch. The folioles of this branch immediately begin to close pair by pair, the common petiole droops, lastly the folioles of the other branches close in turn. At the end of two or three minutes, the nearest opposite leaf, and if the plant is vigorous, most of the other leaves situated below on the same stalk, follow their example. When, after some time, the leaves open again, the same want of sensitiveness is manifested as in the preceding case.

A singular feature in this phenomenon is the manner in which the action of the chloroform is propagated from one branch to another, then from one leaf to another, even when the liquid disappears by evaporation almost as soon as it is deposited. This action, as we have just seen, appears to be communicated from the leaf to the stalk, following in the latter a descending direction ; generally the leaves situated beneath the chloroformed leaf are not at all affected. De Candolle, in making an analogous experiment on a sensitive plant with a drop of nitric or sulphuric acid, remarked, on the contrary, that it was the leaves above the leaf touched which closed, without those situated beneath participating in this motion*. The observation of our learned countryman is quite naturally explained by attributing to the ascending sap the transport of the corrosive poison, a transport which, in this case, would take place in the direction from below upwards. But how to account for the apparent transmission of the effects of the chloroform in the contrary direction, from above downwards ? Might the descending sap more peculiarly have the property of transmitting the narcotic effects of this singular compound from one part of the sensitive plant to the other ? or might there exist in this plant some special organ susceptible of being affected by certain vegetable poisons in a manner analogous to the nervous system of animals ? Notwithstanding the interesting investigations of Dutrochet and other physiologists, there still prevails too much obscurity on this subject to hazard an opinion. But in any case the fact is singular, and appears to me to merit the attention of persons accustomed to engage in questions of this nature.

Experiments of the same kind, made on the contractility of the sensitive plant with rectified ether, have furnished me with results nearly similar to the preceding ; with this difference, however, that whilst one drop of chloroform placed on the common petiole of a leaf situated at the extremity of a branch of a sensitive plant suffices to cause most of the other leaves situated beneath on the same branch to close, ether in general produces an effect only on the leaf itself with which it is put in contact. The next leaves have generally appeared to me not affected, I must however add, that my experiments with ether having been made after the others, and at a time of year when the sensitiveness of the plant already began to diminish, it is possible that the intensity of the effects produced may have thereby been affected.—*Philosophical Magazine.*

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* De Candolle, *Physiologie Végétale*, vol. ii. p. 866.

ROYAL INSTITUTION.

The Friday evening meetings were commenced for the season at the Royal Institution on the 19th of January, when a discourse was delivered

"*On the Idea of Polarity*," by the Rev. Dr. Whewell, Master of Trinity College, Cambridge. He had been induced, he said, to occupy the attention of the meeting with this subject, which in some respects might be considered dry and uninteresting, affording no experimental illustrations, from a conviction of the importance of having clear conceptions of the different ideas involved in the application, under various circumstances, of the term Polarity. There could be no doubt that the notion of polarity is essential to the comprehension of the advances recently made and now making in science.

Before entering upon a consideration of polarity, it was necessary, in the first place, to speak of poles. The first scientific allusion to poles was made by Gilbert in his book on the magnet, published in the commencement of the seventeenth century, where he speaks of the poles or termini which limit the direction of the force of the magnet, and the leading idea still associated with the magnet, is that of its possessing a north and south pole, from which different forces emanate. But Gilbert had further noticed the magnetism of the earth, by which the magnetic needle is influenced. The facts connected with magnetism were at that time but imperfectly known, and some crude theories were therefore suggested for their explanation. Haunsteen, a Dane, collected a number of facts in relation to the magnetism of the earth, from which he inferred that the earth had four poles by which the magnetic needle was attracted. Subsequently, a wider and juster view was taken of the phenomena which had been observed, and these were found fully to harmonize with the assumption of the existence of only two poles. It was shown that the irregularities which seemed to indicate the existence of four poles, were mere local aberrations not materially affecting the general direction of the lines of magnetic force. Finally, the notion of poles was merged into that of polarity.

This notion of polarity has subsequently been applied for the explanation of a variety of phenomena in different branches of science. About twenty years ago, Malus employed the term polarization of light. In this case the term is meant to imply that, in accordance with the undulatory theory, the vibrations are in one plane, giving to the ray of light the character of a flat ruler, so that with certain substances, such as the mineral *tourmaline*, it is capable of being transmitted when the plane of vibration bears a certain relation to the crystalline axis of the mineral, but not otherwise. Whilst, however, in the case of the magnet, the term *polarity* indicates the existence of ends having different properties, in the case of a ray of light it relates to the existence of sides which are different.

In connection with electricity, again, the notion of polarity is applied to indicate the two oppositely endowed ends of a galvanic battery, or of the particles or masses of matter while under the influence of electrical induction. The connection between electrical and magnetic polarity has been developed and traced out by Œrsted and Faraday,

the latter having shown that either of these forces might be transformed into the other.

A similar relation to that observed between electricity and magnetism, was found to exist between chemical affinity and electricity, so that here again there was another case for the application of the notion of polarity.

More recently, Dr. Faraday and M. Plücker have ascertained that a certain relation exists between the direction of the magnetic force and that in which the particles of matter are attracted to each other in the formation of crystals.

The lecturer concluded by drawing a comparison between the theories of M. Couloumb and Dr. Faraday, and pointed out the advantages resulting from the development of theories which tended to afford a rational comprehension of the phenomena of nature.

Friday, January 26th.—"*On the Crystalline Polarity of Bismuth and other bodies, and its relation to the Magnetic Force,*" by Professor Faraday.—This was the subject of a recent communication by Professor Faraday to the Royal Society. The object on the present occasion was to explain in as popular a manner as possible the results of his late investigations on the connection of magnetism with crystallization. Having had occasion to prepare some small cylinders of bismuth, by casting them in glass tubes for some magnetic experiments, he found that they presented anomalous results when placed under the influence of a powerful magnet. A closer examination showed that this arose from the crystalline structure of the bismuth. On selectiug some well-defined crystals of bismuth, and suspending one of these with perfect freedom of motion in the magnetic field between the two poles of a powerful magnet, it was found that the crystal always took a certain position, pointing as a magnetic needle would. If the parts of the crystal which pointed towards the poles of the magnet were turned into another direction, on leaving it free to move they would again assume their original position. The line passing through the crystal, when thus pointing in a direction parallel to the magnetic axis, he calls the *magne-crystallic axis* of the crystal. In the case of bismuth, he has found this to be perpendicular, or nearly so, to the brightest of the four cleavage planes of the crystal. This property which the crystal possesses of pointing, when placed in the magnetic field, is quite independent of any attraction or repulsion exerted towards the poles of the magnet. It is not, strictly speaking *polarity*, according to Faraday, for that part of the crystal which points to the north pole of the magnet would equally point to the south pole if turned round, although it will not remain in any other direction than in this line. He calls this *diametrality* to distinguish it from *polarity*.

Other crystalline substances besides bismuth were found to possess the same property, and it was not found to be confined either to magnetic or to diamagnetic bodies.

He considers that the magne-crystallic force is an induced power, not pre-existing in the crystal, but caused by the influence of a powerful magnetic current.

Want of space obliges us to defer the further notice of these meetings, which have been commenced this season with great spirit.

REVIEWS.

WORKS OF THE CAVENDISH SOCIETY. Vol. II.

Hand-Book of Chemistry. By Leopold Gmelin, &c. &c. Translated by Henry Watts, B.A., F.C.S., Assistant in the Birkbeck Laboratory, University College, London.

Printed for the Cavendish Society.

In a previous number of this Journal (for November, 1848) we have noticed the first volume of the works of the Cavendish Society. Another volume has now been issued as part of the publications of the Society for 1848. Gmelin's *Hand-book of Chemistry* has long been held in very high estimation on the Continent, and also in this country by those conversant with the language (German) in which it is published. To a large proportion of our Chemists, however, it has hitherto been a sealed book, for although it has often been suggested that a translation of this work into English would be a very valuable addition to our scientific literature, yet no publisher has had the courage to undertake it.

We may refer our readers to vol. iii., page 83, vol. iv., page 523, and vol. vi., page 545, of this Journal, for analyses of Gmelin's work, which, when those notices were written, existed only in the language of its author. Having so fully reviewed the original, we shall principally confine our attention on the present occasion to the manner in which the translation has been executed. The task of rendering the work of the great German Chemist into English was committed to Mr. Watts, the able assistant of the late Mr. Fownes, in the Birkbeck Laboratory of University College, and he appears to have well fulfilled what was required in such an undertaking. The last German edition of the first part of Gmelin's work was published in 1843, since which time many important discoveries have been made in the branches of science —namely, the general laws of Chemical action, and the Chemical relations of light, heat, and electricity—to which the present volume relates; and it was desirable that all the most important facts elicited in such investigations, should be incorporated, so as to bring the work in a bibliographical point of view up to the present period: at the same time any deviation from the text of the original would, in a great measure, have destroyed the value of the book as a standard work of reference. In both these respects the translator has fulfilled the requisite conditions: he has adhered closely to the text of his author, and has nevertheless added in separate paragraphs, which are distinguished from the original matter, such notices as were required by the advancement of science.

The principal additions relate to the following subjects:—Relation between atomic weight and density; relation of light to magnetism; the calotype process; thermography; radiation and conduction of heat; expansion; specific heat; latent heat of liquids and of vapours; tension of vapours; liquefaction and solidification of gases; development of heat in chemical combination; decomposition of water by heat; development of electricity by the escape of high-pressure steam; Grove's gas voltaic battery; and the magnetic condition of all matter.

It will thus be seen that a large amount of important matter has been added which will render the translation valuable even to those who are accustomed to refer to the original. The following quotation

will serve as an illustration of the manner in which the author treats his subjects, and it may also serve to show how he has been treated by the translator :—

TECHNICAL APPLICATIONS OF GALVANISM.

1. *Galvanic precipitation of a thin layer of one metal on the surface of another.*

Gilding.—This process may be performed upon silver, brass, or copper, but not upon iron. The apparatus consists of a bladder containing dilute acid, in which zinc is immersed, and a jar within which the bladder is placed. The jar contains the solution of gold, together with the metal to be gilt, which is connected by a wire with the zinc. (The gold solution and the metal to be gilt may also be placed within the bladder,—the dilute acid and a cylindrical zinc plate surrounding the bladder being placed in the outer vessel.)—The more dilute the acid, the feebler is the current, and the better does the gilding go on ;—*e. g.*, six drops of acid to a glass of water. Sulphuric acid is used for silver, nitric acid with copper or brass. —The gold solution, which is made as neutral as possible, contains five milligrammes of gold in a cubic centimetre, and therefore one gramme of gold in a litre (about two pounds). A weaker solution gives a darker, and a solution containing copper mixed with the gold, a redder gilding.— The metal to be gilt must be either polished or merely cleaned. In the former case, the metal takes the gilding more readily, and the gilt surface has a much greater lustre, and merely requires rubbing with fine linen or with leather to give it a very high degree of polish ; in the latter case, the gilding is taken slowly, has a duller surface, and requires to be rubbed with the burnishing steel. Ignited silver takes a finer gilding than that which has not been ignited.

The zinc is attached to a thick copper wire, and this to a silver or platinum wire, which touches at one point the metal to be gilt : this point must however be changed from time to time, otherwise no gold will be deposited upon it. Before the gilding process is commenced, the metal is dipped into dilute acid to free it from all impurities—silver in sulphuric, copper and brass in nitric acid. If the zinc, contained in a bladder filled with the same acid, be at the same time immersed in the liquid, the gas-bubbles evolved on the surface of the silver or copper will serve to cleanse it still more effectually.

After this the gilding is commenced. The bladder with the zinc being first placed in the gold solution the circuit is closed by immersing the object previously metallically connected with the zinc. The metal to be gilt, especially if it be silver, must not be left for a moment in the gold solution without galvanic connection—otherwise it will either not be gilt at all or the gilding will be very bad. If therefore the inside of a vessel is to be gilt, the bladder with the acid and zinc being suspended within it, the gold solution must be poured into the vessel down the sides of the bladder, so that galvanic connection may be immediately formed. The galvanic current must be so weak that scarcely any gas shall be evolved on the surface of the silver or copper ; for any considerable evolution of gas would interfere with the deposition of the gold. A feeble current is particularly necessary when sharp edges occur, for these are difficult to gild. The current is regulated by partially withdrawing the zinc or diminishing the quantity of acid. After remaining for a minute or two in the gold solution, the metal is again immersed in dilute acid ; it is likewise advantageous to immerse the zinc and bladder at the same time (for this makes the gilding more brilliant, and ensures a more abundant deposition of gold at the next immersion). The metal is then briskly rubbed with fine linen and dried, then again subjected to galvanic action in the gold solution—and so on. Polished objects require two or three immersions—unpolished ones five or six.

Brass requires less gold and takes a redder gilding than silver, the gilding on which is rather of a greenish yellow. The gilding is permanent.

Those parts of an object which are not to be gilt are covered with wax, or washed with gold solution by means of a brush.

The solution of gold when weakened by use is concentrated by evaporation. The bladder, which requires frequent renewal, yields a quantity of gold when burnt to ashes. (De la Rive, *Ann. Chim. Phys.* 73, 398 ; also *J. pr. Chem.* 20, 157.)

R. Böttger makes use of the following apparatus for gilding and platinizing. A wide cylinder has a hole in the middle of its base, through which there passes a copper wire cemented in with sealing-wax. The part of the wire within the cylinder is formed into a flat spiral, upon which is laid a piece of amalgamated zinc. The cylinder contains very dilute sulphuric acid. In this is immersed a cylinder open at the top and bottom, but tied over at the bottom with a thin bladder. The cylinder contains solution of gold, in which the metal to be gilt is immersed after it has been first connected by means of a platinum wire wound round it, with the copper wire proceeding from the zinc. (A drawing of the apparatus is given in the memoir.) The gold solution contains one part of chloride of gold, freed as much as possible from excess of acid, in 160 parts of water ; or still better, chloride of gold and sodium dissolved in water. Each immersion lasts for a minute at the utmost, and is followed by washing with water and drying, accompanied by brisk rubbing with fine linen, and polishing with powdered chalk. Silver requires five or six, steel ten or twelve immersions, lasting from half a minute to a minute. When the silver object is connected with the zinc by a copper wire, part of which dips into the solution of gold, the gilding acquires a strong reddish tint ; whereas, when silver or platinum wires are used, it is of a full bright yellow. If the gold solution contains the smallest trace of copper, scarcely anything but copper is at first deposited upon the silver. Copper also does not show any appearance of gilding for some time, because the red colour of the metal shines through. (The same was observed by Biewend, *J. pr. Chem.* 23, 253.) Brass may be gilt almost as well as silver, tin not so well. German silver gives a coppery kind of gilding, not very beautiful. But watch-springs, pen-knives, &c., may be gilt directly by De la Rive's method. Watch-springs take a very beautiful gilding, when they are freed by hydrochloric acid from the blue film of oxide. On long knives the gilding is not uniform, being thickest at the end next the zinc. Steel which is to be gilt must be brightly polished without oil ; that which has been polished with oil does not take the gold ; for it retains particles of oil closely attached to its surface, so that it is scarcely attached by strong hydrochloric acid. (R. Böttger, *Ann. Pharm.*, 35, 221 and 350.)

The bladder recommended by De la Rive reduces a considerable quantity of gold, which gives it a purple colour ; a cylinder tied over with bladder at bottom is therefore to be preferred. Only a feeble current is required, and a single drop of sulphuric acid is enough for every ounce of water. If the gold solution reddens litmus, it produces a dirty yellow coating on the silver, hence it must first be exactly neutralized with carbonate of soda. It must likewise be more dilute than Böttger recommends ; water must in fact be added to it till a plate of silver dipped into it no longer acquires a black coating, but exhibits a bright yellow colour on being rubbed. When the process is thus conducted, the silver no longer acquires a greenish yellow, but a pure bright yellow gilding ; or if it be connected with the zinc by a copper wire, it then takes, as Böttger found, a reddish-yellow gilding. Steel pens, freed by dilute hydrochloric acid from their blue film of oxide, may be gilt without the aid of galvanism, by simply

immersing them in the gold solution neutralized as above, with carbonate of soda. Copper may likewise be gilt in a very short time, either by ordinary chemical action, like steel, or by the galvanic method. (Elsner, *J. pr. Chem.*, 23, 148.)

Walker (*Phil. Mag. J.* 19, 328) makes use of the current of a voltaic battery. The decomposing cell contains a solution of cyanide of gold and potassium ; the anode consists of a plate of gold, and the cathode of the metal to be gilt. As fast as gold is precipitated from the solution on the cathode, fresh gold is dissolved at the anode. A similar method is pursued by Elkington (*Compt. rend.* 13, 998 ; also *Pogg.* 55, 161), according to whom, gilding goes on more quickly at a somewhat elevated temperature than in the cold.—According to Ruolz (*Pogg.* 55, 162), the following solutions are available for this purpose : cyanide or chloride of gold in aqueous solution of cyanide of potassium, ordinary ferrocyanide of potassium or red ferrocyanide of potassium ; chloride of gold and potassium in aqueous solution of cyanide of potassium, or in aqueous solution of soda ; sulphuret of gold in aqueous solution of sulphuret of potassium. The last three solutions are to be preferred—the last, which contains sulphur, being the best of all. In this manner, platinum, silver, copper, packfong, and steel may be gilt permanently, beautifully, and of any required thickness. A solution of one part of chloride of gold and ten parts of ferrocyanide of potassium in 100 parts of water, being subjected to the action of a six-pair Daniell's battery, deposits in three minutes, on a polished silver plate, five square centimetres in surface, the following quantities of gold, varying according to the temperature : at 15°, 0.0126 ; at 35°, 0.0296 ; and at 60°, 0.063 of a gramme.—The quantity of gold deposited on a brass plate of equal size at 15° in two minutes was 0.012 of a gramme. (Dumas.)

De la Rive's method produces a brilliant gilding, that of Ruolz gives a fine frosted surface which may be made bright by polishing. De la Rive's solution acts partly by ordinary chemical action, because it contains too much gold and is not sufficiently neutralized. The following method gives the best results.—Gold-solution : one part of dry chloride of gold and ten parts of ordinary ferrocyanide of potassium are dissolved in 100 parts of water, filtered from cyanide of iron, mixed with 100 parts of saturated solution of ferrocyanide of potassium, and this mixture is diluted with an equal or double quantity of water : the more dilute the solution the brighter is the frosted gilding produced.—*Liquid in the zinc vessel :* solution of ordinary ferrocyanide of potassium and common salt :—solution of common salt alone acts more quickly ; but for gilding silver the solution must not contain too much common salt, otherwise the silver will be blackened by the formation of chloride. All acid is to be avoided ; it gives too strong a current. It is advantageous to have the gold solution and the liquid in the zinc vessel of the same specific gravity, in order that they may not mix too easily. For the same reason, the level of the two liquids ought to be the same. The zinc must not be amalgamated, otherwise chloride of mercury will be introduced into the gold solution, and may be reduced on the metal.—*Vessels :* for gilding small objects, the gold solution may be contained in a glass tube, open at both ends ; for larger objects, in an inverted bell-jar, furnished with a tubulure. The lower end of the glass tube or the tubulure of the bell-jar is tied over with linen, and a layer of kaolin or common clay, free from lime, one centimetre in height, and moistened with solution of common salt, placed at the bottom of the tube or jar. If, instead of glass, vessels of earthenware are used, in which endosmose is stronger than in clay—then, either the inner and outer liquids must have the same composition (with the exception of the gold contained in the inner), or the earthen vessel must be enclosed within a bag of muslin filled with moist clay, so that the vessel may be surrounded with a coating of clay one or two centimetres in thickness.—The brass, copper,

or silver which is to be gilt, is well burnished, and then thoroughly cleansed (*decapé*) by rubbing it with lamp-black moistened with concentrated nitric acid and spread upon linen—then dipping it quickly into water, then again rubbing it—and so on : when perfectly clean and bright, it is well dried. While the gilding is going on, the object is frequently turned, so that the deposit of gold may be uniform. If the deposition goes on too slowly, an additional quantity of common salt is added to the liquid in the outer vessel containing the zinc.—Warming the outer vessel in a water-bath to 20° or 25° (68° or 77° Fahr.), likewise accelerates the gilding, but diminishes its lustre. If any of the gold solution penetrates into the outer vessel, and gold is in consequence precipitated upon the zinc, it must be removed. A thin deposit of gold makes its appearance in ten minutes ; to produce a thick deposit several hours are necessary. The gilding on silver is first greenish, then yellow, then after twelve hours, reddish-yellow. Brass and bronze take the gilding much more quickly. Finally, the gilt object is washed with dilute sulphuric acid, which removes any iron which may perchance have been precipitated, and then rubbed with linen. The gilding holds very fast. (Becquerel, *Compt. rend.* 14, 135.)

When a copper plate is to be etched,—instead of covering it with the ordinary etching ground, it may be gilt by De la Rive's method, and then the gold removed with the needle ; in this manner much finer lines are obtained. Moreover, since the gold remains attached to the surface, the plate may be corrected, if the first impression should be faulty. (De la Rive, *J. pr Chem.*, 22, 376.

Platinizing.—This may be done upon silver, brass, or copper. The apparatus is the same as that of Böttger for gilding. The platinum solution used consists of one part of chloride of platinum in 160 parts of water—or better, one part of chloride of platinum, and one part of common salt in 160 of water. The latter solution yields a sufficient deposit after three immersions ; whereas with the former, six immersions are nscessary, and the coating of platinum is rather grey than white. Copper which has been platinized, is afterwards well adapted for gilding. This may be done with objects obtained by the electrotype process—a copper wire being fastened to the centre of the hinder surface, that surface covered with wax, the front surface freed from every trace of oxide by rubbing with dilute hydrochloric acid and fine washed sand—then, by the preceding method, first platinized and afterwards gilt. Any part on which the oxide still remains will not be coated, and must afterwards be cleaned with sand and acid. (R. Böttger).

For platinizing by the current of a six-pair Daniell's battery, it is best to use a solution of chloride of platinum and potassium in potash. The operation goes on as quickly as gilding. But from a solution of one part of cyanide of platinum and ten parts of yellow ferrocyanide of potassium in 100 parts of water, platinum is very slowly precipitated, even when assisted by the application of heat. (Ruolz and Dumas, *Pogg.*, 55, 164).

Silvering.—Copper and brass may be silvered in the above apparatus, by means of a solution of one part of fused nitrate of silver (lunar caustic) in five and a third part of aqueous ammonia; but the first immersion must not last longer than a second. (R. Böttger)—Walker proceeds, according to the method described on page 499, with a solution of cyanide of silver and potassium as the electrolyte, and a silver plate as the anode. According to Ruolz, who likewise uses cyanide of silver and potassium, silvering may be produced on gold, platinum, copper, bronze, brass, iron, cast-iron, steel, and tin, and is very permanent.—A solution of one part of cyanide of silver and ten parts of ordinary ferrocyanide of potassium in 100 parts of water, may also be used. (Dumas).

Coppering.—A solution of cyanide of copper in cyanide of potassium or sodium, yields a coating of copper when acted upon by the current of an

eight-pair Daniell's battery—but the deposition of the copper is very slow. (Ruolz)—In a similar manner, metals may be coated with lead, cobalt, or nickel. (Ruolz).

Tinning.—Clean copper or brass, in contact with cuttings of tin in a boiling solution of peroxide of tin in potash, becomes covered in a few minutes with a white permanent layer of tin. (R. Böttger.)—Bronze may likewise be tinned in this manner. With electro-positive metals, on the contrary, such as iron or zinc, the current of a battery is necessary. (Ruolz.)—On this principle depends the tinning of brass pins by disposing them in alternate layers with tin plates, and boiling the whole in a solution of cream of tartar.

Zinking.—Copper or brass cleaned with dilute hydrochloric acid, and placed in close contact with granulated zinc, in a boiling saturated solution of sal ammoniac, or a solution of chloride of zinc, acquires in a few minutes a specular covering of zinc. Cream of tartar, in place of sal-ammoniac, does not occasion a deposit of zinc. (R. Böttger, *Ann. Pharm.*, 34, 84, 39, 172).—By means of the electric current of a battery, iron wire, iron plate, cast-iron, &c., may also be coated with zinc, and preserved from rust. (Ruolz).

In conclusion, we have only to add that, to those who desire to possess an English version, the only one ever likely to appear, of this the most complete and extensive systematic work on Chemistry extant, the opportunity is now presented on much more favourable terms than could be offered under the ordinary circumstances of publication. The fact of its being attainable only by members of the Cavendish Society, will no doubt cause a considerable accession to the numbers of this useful association. Two more large volumes of the Hand-book, in addition to a third book on some other Chemical subject, will be issued during the present year to the subscribers for 1849.

COURS ÉLÉMENTAIRE D'HISTOIRE NATURELLE: BOTANIQUE. By M. ADRIEN DE JUSSIEU, Membre de L'Institut, &c. Translated by JAMES HEWETSON WILSON, F.L.S., &c. London: JOHN VAN VOORST, 1849. Fcp. 8vo., pp. 750.

WE are glad to find that the admirable *Elements of Botany*, by M. Adrien de Jussieu, has at length been translated into the English language. The original work forms part of the Elementary Course of Natural History adopted by the Conseil Royal de l'instruction publique, for the use of the colleges in France. Let us hope that the time is not far distant when our ruling bodies will also place the sciences under their fostering care. It is a disgrace to the government of this country, boasting as it does to be foremost in civilization, that our scientific and literary men receive so little encouragement. We are not without hope that the recent changes in our universities, in the admission of the sciences in their extended curriculum of education, may tend to further, in some measure, this most desirable object.

We have long been in the habit of consulting the work of our author, and also of recommending it to students acquainted with the French language, as an admirable digest of the science of Botany, and we trust that its appearance in English will repay both the translator and publisher for their exertions. It is very well translated by Mr. Wilson, and when we state that it contains about seven hundred and fifty closely printed pages, and is illustrated by nearly eight hundred wood-cuts, our readers will agree with us in believing it to be published at a very reasonable price. This work is rendered more com-

plete by the translator, having added an introduction, taken from the *Treatise on Zoology*, published in the same course. This contains, besides other subjects, some good observations on the object, utility, and method of studying Natural History, as also some remarks on the distinctions between the three kingdoms of nature. The distinctive characters between the Animal and Vegetable kingdoms having been treated of in the last number of our Journal, we will only mention at present some of the Chemical characteristics, as given by Jussieu in this work, between a Vegetable and an Animal membrane.

"The Vegetable membrane, when decomposed, furnishes acid products and residues; when burnt, acetic acid and a carbonaceous residue, which is not altered in its shape; it is not coloured by the aqueous solution of iodine, is not very sensibly affected by dilute solutions of soda and potassa, by ammonia; not at all by the hydrochloric, acetic, and tannic acids. The Animal membrane, when decomposed, on the contrary, gives both acid and ammoniacal products and residues; when burnt, carbonate of ammonia and a spongy carbonaceous residue; it is coloured yellow by iodine; is dissolved in soda, potassa, and ammonia, in hydrochloric and acetic acids; is contracted by tannic acid, at the same time combining intimately with it. Such are the distinctive characters clearly established by the numerous researches of M. Payen."

After this introduction, Jussieu commences with the Anatomy of the Organs of Vegetation, and then proceeds to describe their functions; and afterwards the Anatomy and Physiology of the Organs of Reproduction and Fecundation, and concludes this portion of the work with an account of the General Phenomena of Vegetation, including under this head the Colouring Principles of Vegetables, the Development of Heat and Light by Plants, and the Phenomena of the Directions and Motions of Plants. In treating of these subjects he is always remarkably clear in his descriptions—as an instance of this we might refer to the section "on Phyllotaxy, or the arrangement of the leaves on the stem," in which a somewhat complicated subject is rendered at once intelligible by the very lucid description of the author. The translation is in this part also very good.

We think that the translator might have added to the value of the work by appending a few notes to certain portions, for the original treatise has been now published some years, and in that time great progress has been made in Botany. Accordingly, as might have been supposed, there are several errors or omissions in the text. We will give a few examples of the progress and alterations that have taken place in certain parts of Botany. Thus, the description of Laticiferous Tissue, as it is given by Jussieu, has been considerably modified, indeed, many authors consider these Laticiferous canals to be nothing more than intercellular passages, lined by a proper membrane; and then again the phenomena of Cyclosis, mentioned by Jussieu, has been shewn to have no real existence in nature, but to be produced by the wounding or compression of these so-called Laticiferous canals.

We have also here no mention of Gasparrini's discovery of that additional process of the Stomates which is found in certain plants, and has been named a Cistome. It consists of a prolongation of the cuticle into the cavity beneath the Stomate in the form of a funnel-shaped expansion.

Again, our views with respect to the Development of Cells, Leaves, Stems, and other Organs, have been considerably modified and enlarged

of late years by the researches of Mohl, Nageli, De Mercklin, and many other botanists, of which we have, of course, no description in the present work; as also we find no mention of M. Panchon's memoir on the arrillus of plants, which has been already noticed in this Journal (*See* page 306 of the present volume). Valuable researches in Embryology and many other parts of Botany have been also made since the first appearance of the original work: we will not multiply examples, but think the translator would have done right to have adverted to some of them in notes—more particularly when recent discoveries have shown the views of the author to be in any respect erroneous.

After the Anatomical and Physiological part of the work, M. de Jussieu enters upon an examination of the Principles of Classification and explains a few of the more important Systems and Methods that have been proposed at different times for the Classification of Plants. He then gives the characteristics of a few important Natural Orders or Families, the characters of which appear to be extremely well selected. In this work the method of A. L. de Jussieu has been followed in the chief divisions; but the order in which they were originally placed has not been strictly followed, as our author, contrary to the general opinion, considers a monopetalous flower of a higher value than a polypetalous flower, and, therefore, in treating of the Families proceeding from the simple to the compound, he commences with Acotyledons and finishes with the monopetalous Dicotyledons, which he considers highest in the scale. We cannot agree with this deviation from the usually received opinion of botanists, and consider those plants most highly organised in which all the parts of the flower are present and distinct from each other, as is the case in the Thalamiflorous Dicotyledons in the method of De Candolle, now usually followed in this country. In treating of the natural order Umbelliferae, the author states that the energy of the properties of plants of this order are augmented or diminished according to the heat of the climate, thus Conium maculatum, a dangerous poison in the South of Europe, may be eaten without hurt in Russia, Again, we see the injurious properties of this order destroyed when certain parts of the plant are protected from the action of the light, as in the roots of the Carrot, the Parsnip, &c. &c.; this effect is also artificially produced by the gardener, by earthing up certain portions destined for food, as in the stem of the Celery. Our readers will see the great value of the application of these principles to the growth of pharmaceutical plants.

"The infusion of tea-leaves which belong to the order Ternströmiaceæ, Jussieu states, is not alone an exciting beverage, but also a nourishing one; and it appears that the Chinese and other Asiatic nations do not confine themselves to the infusion, they also eat the leaves when boiled. Now, since after the tea-leaves have been deprived of their soluble principles, which are: 1st, An essential oil which communicates the aroma. 2dly, The theine, a third substance, the caseine, still remains, and in such a proportion that this residue may contain 28 per cent. of this constituent, it follows that the leaves furnish food very much richer in azote than the infusion."

After the Natural Orders, Jussieu gives a most interesting chapter on Botanical Geography, showing the influence of climate, soil, temperature, and other peculiarities (all of great importance to the Phar-

maceutist) which influence the distribution of plants. Having thus given an account of the distribution of vegetables on the surface of the globe, he proceeds to investigate whether this distribution has been the same at all times, and thus gives a short account of Fossil Botany, a subject of very great interest when we consider that Coal, so invaluable as fuel, has been formed by masses of vegetables accumulated through a series of ages. A glance over the phases of vegetation revealed to us by the fossils, shews us a curious and interesting fact: that the progression from the simple to the compound, which it was the object of natural classification to establish in the series of the Acotyledons to the Cotyledons, and thence to the Dicotyledons, is realised in a general manner in their successive appearance on the surface of the globe.

Thus our readers will see that in this work the different branches of Botany, including the Anatomy and Physiology of Plants, the Classification, Geography of Plants, and Fossil Botany, have been treated by the accomplished author in a most comprehensive and lucid manner, and we can cordially recommend it as a valuable text book of Botany to the student attending a Botanical course of lectures.

Sequel to Outlines of Medical Proof. *By* Thomas Mayo, M.D., F.R.S., &c. 8vo, pp. 41. Longman.

The Code of Safety, *or Causes, Effects, and Aids, preventive and curative, as well as of other Epidemics, as also of Asiatic Cholera.* *By* G. F. Collier, M. D., &c. London: Published by the Author. 8vo, pp. 96.

OBITUARY.

GEORGE FOWNES, Ph. D., F.R.S.

It is our painful duty to record the death of Dr. Fownes, which event occurred on Wednesday, the 31st of January, at the residence of his father in Grange Terrace, Brompton. Dr. Fownes had not yet completed his thirty-fourth year, having been born on the 14th of May, 1815. He was the eldest son of Mr. John Fownes, the well-known and highly respected glover, of Coventry Street, Leicester Square. Having received his education, first with Dr. May, of Enfield, and afterwards at Bourbourg, near Gravelines, in France, he was apprenticed to his father, who was anxious that he should succeed him in the business, and in this occupation he continued until his 22d year. The engagements of business were, however, particularly distasteful to him, and much of his leisure time was devoted to scientific pursuits. When about seventeen or eighteen years of age he became a member of the Western Literary Institution, and with the late Mr. Everett, Mr. Henry Watts, Mr. Robert Murray, and others, established a philosophical class, in which they contributed to their mutual improvement by lecturing and otherwise. His disinclination for the business to which he had been apprenticed becoming stronger, and his taste for science increasing, it was at length determined that he should devote his exclusive attention to the latter. Accordingly in January, 1837, his father placed him with Mr. Everett, who was then chemical lecturer at the Middlesex Hospital. In this situation he continued for two years, with the exception of a period of three months, during which he prosecuted his studies in the laboratory of Professor Liebig, at Giessen. After his return from Germany he was invited by Professor Graham to assist him in the laboratory of University College, and of the opportunity thus offered of being under so experienced and kind an instructor he promptly availed himself. Twelve months afterwards he relinquished this situation and became chemical lecturer at Charing-Cross Hospital. Here, in an incon-

venient and badly-ventilated laboratory he pursued many researches in organic chemistry, which, no doubt contributed to injure his naturally delicate health.

In June, 1841, he delivered his first lecture (on Chemistry applied to Agriculture) at the Royal Institution; and in May, 1842, he commenced a course of lectures on Organic Chemistry in the same place. About this time also he published an essay on the Food of Plants.

In the summer of 1842 he was appointed Professor of Chemistry to the Pharmaceutical Society, in which capacity he commenced his labours in October of that year.

In consequence of the severe illness and subsequent death of Mr. Everett, Dr. Fownes was induced to leave Charing-Cross Hospital and undertake the lectureship at Middlesex Hospital, where he had the advantage of a good and commodious laboratory. He was now delivering complete courses of lectures at two institutions; namely, at the Pharmaceutical Society and at Middlesex Hospital, and in addition to this he occasionally lectured at the Royal Institution, where, in the summer of 1843, he gave a course of lectures on Chemical Philosophy. In this last-named year he obtained the Acton Prize for his essay entitled *Chemistry, as exemplifying the Wisdom and Beneficence of God.*

Notwithstanding the various duties which thus devolved upon him, his private researches were not neglected: in 1844 the Royal Society read and published his paper on the Existence of Phosphoric Acid in Rocks of igneous Origin; and in the following year his papers on the Artificial Formation of a Vegeto-alkali, and on Benzolin, for the former of which the gold medal was awarded him. The *Transactions of the Royal Society* also contain the results of his investigations on the value in absolute alcohol of spirits of different specific gravities. He was elected a Fellow of the Royal Society in 1845.

In 1844 he published his *Manual of Chemistry*, which is well known as a most useful work for students. A second edition of this work has already appeared, and in the correction and improvement of this the author was engaged up to the period of his death.

For several years past the state of Dr. Fownes's health had considerably declined. He was frequently affected with a troublesome cough, and shortness of breath, which rendered lecturing a severe labour to him. In 1845 he was advised to give up lecturing at Middlesex Hospital, and this he did on being appointed Professor of Practical Chemistry in the Birkbeck Laboratory, at University College, an appointment which he held until the time of his death. In 1846 the state of his health obliged him to relinquish his lectures at the Pharmaceutical Society. But although his public duties were thus contracted, his mind retained its accustomed activity, and his time was still fully occupied in the pursuit of the science to which he had devoted himself. The state of his health instead of improving became gradually worse. It was now evident that his lungs were diseased, and in the autumn of 1847 his kind friend and medical adviser, Dr. Bence Jones having strongly urged him to seek a warmer climate than that of this country during the winter, he relinquished his active duties with much regret, and departed for the island of Barbadoes. He returned to London early in the following spring, with but little improvement in his health, but fully prepared to meet the result which he had himself for a long time anticipated. Unable any longer to work in his laboratory, he devoted much of the remainder of his time to the use of his pen.

We have only to add to this short notice the expression of deep regret at the early removal of a gentleman so eminently calculated by his natural abilities, disinterested love of science, and strong antipathy to every species of quackery, to advance the best interests of science, and to rank among the best of the Chemists of this country.

TO CORRESPONDENTS.

Mr. Hooper requests us to state, that in the report of the proceedings in Guildhall, quoted and commented upon in our last number, pages 357 and 360, the explanation furnished by him to his legal adviser was entirely misunderstood and distorted. The correct version of Mr. Hooper's instructions to his assistants is this—That if, during his absence, any prescription should come in respecting the meaning or accuracy of which any doubt exists, his Assistants are not to prepare it at random, but to refer to Messrs. Allen and Hanbury, whose establishment is at no great distance. This is entirely a different version of the "explanation," and we are glad to find that our suspicion was correct, namely, that the lawyer had made a mess of it from not being learned in physic.

G. F. (Richmond).—The seeds of Iberis amara (bitter candytuft) are said to be acrid, bitter, and purgative. The general qualities of the plant anti-scorbutic.

The Exclusive.—The following is forwarded to us by a Correspondent at Plymouth, being a faithful copy of a prescription of a Physician of that town, who orders all his patients to go to one particular shop. Occasionally they disobey, as in the present case—hence this exposure of the system of the "Exclusive."

"℞ I. P. ℈ii.
Iod. g. iis.
S. A. ʒvj.
A. C. ʒv. M. ʒss. c. ʒj. aq. ter. die."

"℞ Pil. Hyd. g. vj.
Ext. Corb. g. xx. M. ft. pil. vj. i. o. n."

Curiosus.—See Vol. vii., No. 7.

B. H. (Farnham)—Mr. Tomes on the Teeth, is probably the kind of work required.

A. P. S. (Cork).—Godfrey's Essence is a strong perfumed solution of ammonia for smelling bottles. It is prepared by Messrs. Godfrey and Cooke —we are unable to give the formula.

J. C.—The precipitated tersulphide formed by passing sulphuretted hydrogen through a solution of arsenious acid, will bear the same relation in quantity to that of the arsenious acid present that the equivalents of the two compounds bear to each other. Thus, 124 parts of the tersulphide will represent 100 parts of arsenious acid.

Juvenis.—We consider the definition to be an imperfect one.

Analysis.—Articles such as those alluded to are given in vol. iv. pages 217 and 561.

B. L. K.—For the preparation of bisulphuret of carbon, see page 435 of the present number.

A Southport Member.—Much of the apparatus described in Redwood's *Practical Pharmacy* may be obtained at Griffin's, 53, Baker Street; Button's, Holborn Bars; or Knight's, Foster Lane, Cheapside. Any of it would be supplied from either of these places if ordered with a reference to the page at which it is described.

D. F.—Syrup of citrate of iron and quinine is generally made by dissolving sixteen grains of the salt in an ounce of simple syrup. There is no authorized formula.

A Registered Apprentice.—We know of no formulæ for the preparations named.

Aper.—Acetate of lead and chromate of potash yield an insoluble yellow precipitate, and cannot be used for making a show colour for a shop window.

A. P. S.—Water and a sponge.

D. W. D.—We are unacquainted with the nature of the change alluded to.

J. C. K.—It should have been vol. iii., p. 289.

Alcohol wishes to be informed where he could obtain a set of tables indicating the correspondence of degrees of specific gravity at different temperatures, with the indications of over and under proof furnished by Sikes's hydrometer. For instance—given the specific gravity and temperature of a sample of spirit of wine—what is its strength over or under proof by the hydrometer? [There is a table of the description required in Redwood's edition of *Gray's Supplement to the Pharmacopœia.*]

J. B. M. (Ewell)—We are not acquainted with any circulating library of Medical and Pharmaceutical books.

Amator Scientiæ (Worthing).—(1.) We are not learned in quack medicines. (2.) *Medicines, their Uses and Modes of Administration,* by Dr. Neligan. (3.) Griffin, Baker Street, London.

F. S. (Manchester).—See Vol. vii., No. 7. There is no law prohibiting Assistants from taking situations before passing the Examination; but it is optional with Chemists whether they engage them. It would occupy more than ten weeks to prepare for the Examination.

Alpha (Bath.)—See Vol. vii., No. 7. Chiefly the natural system. Dr. Lindley's *School Botany* and *Introduction.*

Pharmaceutical Directory.—We have received Mr. Orridge's announcement of a *Pharmaceutical Directory and Price Register.* If the plan of the Directory is to be similar to that of the *Medical Directory,* the undertaking will be a laborious one, and the result is much to be desired. We cannot understand why the Price Register is to be combined with the above. The two objects appear to us to be quite distinct.

A Correspondent (Bath) has sent us a little pamphlet on Corns and Bunions, and on the Human Hair, by a Chemist and Chiropodist, M. P. S. However undesirable or derogatory this union of "professions" may be, there is no law to prohibit it.

Several articles in type are unavoidably deferred.

ERRATA (*last Number*).

Page 379, line 22 from below, *for* "extend," *read* "stand."
Page 380, line 12 from above, *for* "exterior," *read* "interior."

Advertisements to Mr. Churchill, Princes Street, Soho.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the Editor, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. X.—APRIL 1st, 1849.

MEDICAL REFORM.—DEMOCRACY AND CONFUSION.

In one respect unanimity reigns in the profession—all parties want reform. The troubled spirits, who, like the stormy petrel, are always in their element in tempestuous weather: the anxious candidates for the patronage of the public; the worn-out victims of excessive patronage; the advocates of theoretical perfection; and the plodding practical men who are wending their way towards the *otium cum dignitate*—in short, all classes, however different may be their circumstances or prospects, unite in the one grand sentiment—that reform is required. But here the unanimity ends. What kind of reform is wanted?—how is it to be obtained?—or what is the precise meaning of the word? These are questions to which the old adage is applicable—

"Tot homines quot sententia."

The Medical Profession may be considered in a state of civil war. Abstract principles being disregarded, the real object of reform being generally forgotten, the combatants on all sides have become entangled in a struggle which is rather personal than professional, and, like the projectors of the Tower of Babel, their project is likely to be frustrated by the confusion of tongues.

While the surrounding country is in the hands of the Philistines—or in plain language, infested by quacks and ignorant impostors, the champions of the profession and guardians of the public health are engaged in a siege, the ancient corporations being in possession of the citadels, which are the scenes of an infinite variety of assaults, repulses, and capitulations.

The two grand citadels are the Colleges of Physicians and Surgeons, round which the numerical forces of the profession are encamped, not under one banner, but under different leaders, each of whom suits his tactics to the temperament of his followers. Of these subdivisions in the camp, three only are of sufficient importance to claim particular notice, the first of which is—

THE NATIONAL INSTITUTE OF GENERAL PRACTITIONERS.

This body was established in the year 1845, and has been up to the present time engaged in the endeavour to effect an arrangement primarily by the influence of combination, and subsequently by a capitulation with the corporate bodies. In the first instance, the Institute, which was styled the "National Association of General Practitioners," was considered to represent that body, and its great accession of numbers brought into the field a formidable array of influence. The line of policy adopted as the means of introducing reform, was

the establishment of a new corporation on an equality in rank with those already existing, and the several powers and privileges to be claimed for this proposed body, have been the subject of interminable disputes and negociations, during which the party has split into several factions.

The Institute, which may be considered the moderate radical party, has taken the judicious course of opening a communication with the Colleges of Physicians and Surgeons, in which the Society of Apothecaries has united, and the delegates of these bodies have agreed upon certain principles which they are prepared to support, as the basis of any measure which may be introduced. Sir George Grey having declined last year to proceed any further with the question until the profession had arrived at some definite understanding, this arrangement was the only means by which any progress could be made, and the Institute published in August last a report of their proceedings up to that time, comprising the draft of a proposed Charter, the outlines of a Bill, and the principles of medical reform, which had been agreed upon by the delegates, and confirmed by their several sub-committees and committees. Although we cannot entirely approve of the "principles" thus promulgated, more particularly in regard to the pharmaceutical department, yet the arrangement was in itself a step in the right direction, and afforded some grounds for hope that the negociation might eventually lead to a favourable result. The disagreement between the Institute and Mr. Wakley, who has for many years been the champion of the General Practitioner, has occasioned some difficulty, having given rise to another faction, which may be called

THE WAKLEY PARTY.

The result of this disunion in the camp was the Medical Registration Bill of last session, which having been opposed by the existing Corporations, by the Institute, and by the Chemists and Druggists, was withdrawn. It would appear that the "principles" adopted by the Institute, were not sufficiently liberal to suit the politics of the hon member for Finsbury, who has given the nickname of Snipe and Sneak to the two delegates of the Institute, and who will not sanction the concessions proposed by that body. Thus, while the Institute is recognised by the existing Medical Corporations, and by the Government, as representing the General Practitioners of this country, Mr. Wakely, as the organ of a section of that body, repudiates this jurisdiction, and calls upon the "thousands of insulted Practitioners" to come forward and assert their rights to be placed on an equality with the Physicians and Surgeons. For this purpose a £500 fighting fund is proposed, and a subscription list is opened, which serves to enliven the pages of the *Lancet* with an amusing correspondence. The following is an example :—

To the Editor of the Lancet.

Sir,—Let my name, as a rank-and-file man, be added to the "Medical Reform Fund," now raising to fight the battle of the General Practitioners. It is not possible to compel the citadels in Pall Mall and Lincoln's Inn Fields to surrender without a fierce struggle ; but without ammunition how can a breach be effected ? I therefore enclose my sovereign. I hope

shortly to hear that your roll is completed, your supplies are in camp, and that your corps of volunteers are ready for action.

I am, Sir, your obedient servant,

Many subscribers announce their names for subscriptions of ten shillings, and a few go as far as two guineas, "or more if required." This movement is disconnected with that of the Institute.

A third party has come into the field under the designation of

THE MEDICAL PROTECTION SOCIETY.

The primary functions of this Society are the protection of trade and the collection of bad or doubtful debts. It is founded on the model of other "Trades' Unions," or "Mutual Communication Societies," which are the terror of slippery debtors, whose names and addresses are published for the benefit of members in general. We are told in the Prospectus that it was thought

"desirable and beneficial to establish a Society of Mutual Communication *exclusively* for the profession; but that, instead of meeting together (as is done, and which is indeed necessary for other objects, amongst tradesmen) the business be conducted by a party acting between the inquirer and the party affording the information, for reasons which may perhaps suggest themselves. It was thought this would be best effected by the establishment of a central office, which, under the name of "The Medical Protection Office" (so called not alone to conceal the real system of its operation, but on account of its other protective and more important features) is now being extensively organized."

By way of carrying out the system of concealment, each member has a number under which his questions are asked and answered, no name appearing except that of the patients whose bills are unpaid. These appear chiefly to belong to the poorer classes; for instance, toll-gate keeper, cat's-meat man, shoemaker, lawyer's clerk, gardener, pot-boy, groom, footman, fisherman, omnibus man, potato salesman, &c. Some, however, are among the higher order of society. They are all registered in one list of "General Practitioners" in the art and science of changing their abodes without informing their creditors.

The office of the Society is next door to the College of Surgeons, with which however it has no connexion. It is also unconnected with the Institute, and both these institutions are severely handled in the *Lancet*. The Medical Protection Society issues a monthly periodical, entitled the *Medical Protection Circular*, containing the names of long-winded patients, with editorial matter somewhat original in its character. The principles of this society, so far as we have been able to gather from the published statements, appear to resemble those of the other two factions above noticed. The republican or democratical form of government is the basis of the systems proposed for improving the state of the profession, and the destruction of the two Colleges is the means by which the desired mediocrity is to be attained. In addition to the functions above alluded to, the Medical Protection Society has commenced a crusade against Chemists and Druggists, of which a specimen is subjoined.

THE PROSECUTION OF CHEMISTS IN COUNTY COURTS.

The case of the Master and Wardens of the Apothecaries' Company *versus* Lobo, has occasioned some little excitement in the Profession and its suburbs. The action was instituted by the Medical Protection Society, who borrowed the name of the Apothecaries' Company on the occasion. The result is unimportant, although it has been used as a stalking horse for the new Society. The question, however, remains where it did before. It was a drawn battle—the plaintiffs and defendant having entered into a compromise.

In the *Medical Protection Circular* for March 1st, we find the following extraordinary observations founded upon the supposed triumph :

"We cannot refrain from dwelling upon the very great importance of this now established precedent. One thing is certain, that the profession will see a new era. The law is now discovered to be sufficiently ample and effective for all the purposes of protection.

"A Chemist and Druggist cannot even make up a prescription, much less prescribe, without subjecting himself to a penalty in each case. An Apothecary alone is legally authorized to prepare Physicians' prescriptions, and we much doubt whether a Physician himself is not acting improperly for causing his prescription to be made up by an unqualified man. Such an individual, however, ought no longer to exist. If so, the fault will lie entirely with the qualified practitioners in his immediate neighbourhood. Six or eight of the latter, upon subscribing each a guinea, have it in their power to break up his establishment, and this with the least possible trouble to themselves.

"As yet we have scarcely been able to draw up any decided plan of the campaign, but we will hazard a few observations in anticipation of our services being required ; and, first, we would observe that any plan which has only a partial and limited application, will be worse than nothing, the result being parallel to the case of a parent who corrects his child for the same fault which upon another occasion he overlooks, thereby rendering the child uncertain whether his fault will be noticed or not. In some points the Medical Protection Office is peculiarly adapted, at the present moment, for all the purposes of protection, because of its numerous agents both in town and country, which it is obliged to appoint, as occasion requires, for other purposes, so that each district would have its appointed agent ready to procure and arrange the necessary evidence.

"In other points it is not so well prepared as the Apothecaries' Society, the profession not having yet placed at its command those funds which are requisite for extensive prosecution.

"With the entire concurrence and co-operation of Members, however, this difficulty can be overcome. For instance, as before stated, six or eight members subscribing a guinea each for every prosecution, and presenting the same to the Office, might be entitled to call upon the Office to institute proceedings. The prosecution being successful, and the costs allowed and paid, the Members might be entitled to the return of their guineas which would be placed to their credit, or if unsuccessful, be retained. It must be borne in mind that the costs allowed by the County Court are so small that they could never cover the actual sums expended in obtaining evidence and conducting the case by counsel as the importance of each would demand : but, as the prosecutor would be entitled to half the penalty when recovered, it is anticipated that by some name connected with the Office constituting

himself a public prosecutor, by which arrangement no Member's name need be divulged, the necessary machinery could be sustained in a sufficiently extensive and effective manner, to answer all the requirements of the professional body. Doubtless, however, before the next publication, some plan will be organized on consultation with the committee."

The ignorance displayed in the above article is so palpable that we should not have considered it worthy of notice, if it had not been the subject of several communications from correspondents, who desire an explanation of the facts. In the first place, it is absurd to draw any inference from a case in which no verdict was given, the judgment having been the result of a mutual arrangement between the two parties. Secondly, the application of the case to the suppression of Dispensing Chemists is very ridiculous. The author of the article appears to be ignorant of the existence of the clause exempting Chemists from the operation of the Act.

The climax of the joke is the proposed plan by which six or eight Apothecaries are to unite in "breaking up the establishment" of a Chemist. This resembles the attack of six or eight Chartists on a baker's cart on Kennington Common during the riots of last year.

There is only one ground upon which this childish effusion is at all worthy of notice, namely, as an indication of the *animus* of the Medical Protection Society, which may show itself in other cases. In the event of an attack being made upon a Chemist unacquainted with the proper mode of defence, he might be induced to enter into a compromise, or by mismanaging his case he might be instrumental in furnishing a mischievous precedent. It is therefore important that application should be made to the Council of the Pharmaceutical Society by any Member who may be the subject of an unjust attack.

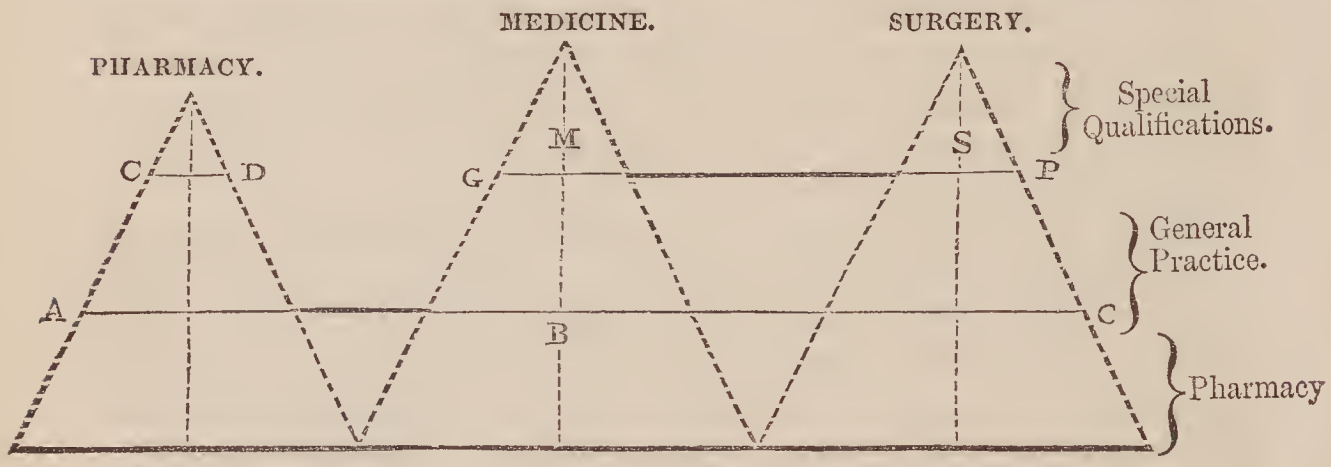
It must not be understood from this observation that we wish to encourage Chemists to violate the law by practising medicine and visiting patients.—Quite the contrary. Any Chemist transgressing the limit of propriety in this respect would seriously injure our cause by furnishing a case for a prosecution. We have on many occasions explained the nature of those cases of emergency or casual administration of medicine in the shop, which do not strictly come under the definition of medical practice; it is therefore needless to enlarge on the subject at present. We should be glad to use all our influence in promoting an entire separation of the two functions—prescribing and dispensing, conceiving that much advantage would arise from this mutual arrangement; but we shall always resist a one-sided policy, especially when it assumes the form of persecution on mercenary grounds.

THE PROPER ORGANIZATION OF THE MEDICAL PROFESSION.

HAVING given a brief sketch of the pugnacious movements now unhappily in progress in the profession, we propose to take a pacific view of the question by way of elucidating the principles upon which we think the points in dispute might be arranged with justice to all parties.

These principles comprise as their elements the union of influence, the division of labour, and the appreciation of merit.

We include Pharmacy in the programme, this being the common ground which constitutes the foundation of education in all departments of the profession, and accordingly in the subjoined diagram, which will serve to illustrate the proposition, Pharmacy is the base of the structure.



Every medical man, whether he be a Physician, a Surgeon, or in general practice, must possess a certain amount of knowledge respecting the nature and properties of the remedies employed. This is represented by the line A B C, and it constitutes literally the A B C of medical education in every department.

Again, every Physician must possess some knowledge of Surgery, otherwise he would be at fault when called in consultation in surgical cases; and the Surgeon must acquire a certain amount of medical knowledge, without which he would be unable to combat the constitutional results of accidents or surgical treatment.

The line G P represents the common ground, which all Practitioners, whether medical or surgical, must reach in order to be able to practise in any department. This may be termed the "state qualification," being defined by law, and having reference to the safety of the public.

In the Pharmaceutical department there should also be a "state qualification," represented by the line C D, which denotes the degree of proficiency requisite in all persons who embark in Pharmacy as their especial business, and who are eligible as Members of the Pharmaceutical Society. This standard is higher

than that required in this department in the case of medical practitioners, who may be perfectly qualified to prescribe medicine without possessing that practical experience in the manipulations of the shop and the laboratory, which is essential to the Pharmaceutical Chemist.

Reverting to the medical department we have arrived at the line G P, from which the special qualifications take their origin. A practitioner having complied with the requirements of the state, by acquiring that general proficiency which the safety of the public demands, may make his election between three courses which are before him. He may remain where he is and embark in general practice, or he may rise a step higher either in medicine or in surgery. At this line the division of labour begins. The Colleges of Physicians and Surgeons are the representatives of the two special qualifications, and those who desire to join either of these Colleges may become Licentiates or Fellows by graduating and passing the required examinations. The regulations for the admission of candidates are and ought to be such as to elevate the standard of qualification to as high a degree as may be found practicable, and at the same time the door should be open to all those who can substantiate their claim on the score of merit and proficiency.

These conditions being fairly carried out, no member of the profession could reasonably complain. Any man who is dissatisfied with his position has the remedy in his own hands. The pyramid of distinction is before him ; there is no limit to his promotion except the limit of his own ability and perseverance.

In Pharmacy the same principle should be carried out. The state qualification, being prescribed by law for the safety of the public, a superior distinction of "Bachelor of Pharmacy," or "Fellow of the College of Pharmacy," should be established as a stimulus to exertion and a reward of merit.

In our illustrative diagram, the dotted lines denote the ascent from the base to the summit, and it will be seen that there are two modes of attaining the same point, namely, the perpendicular and the oblique. We term, figuratively, the perpendicular ascent the course adopted by those who aim directly at a special qualification. The oblique ascent is that which passes by more gradual and easy steps through the neutral ground of general practice. For example :—The pure physician regulates his course of education according to the complete system laid down by the College. He is aware, from the commencement of his studies, that he will not obtain his qualification until he shall have attained the age of twenty-six. His preliminary education is extended, and the whole period of his studies protracted, in accordance with the object in view and the position to which he aspires. During his probation

he must live, and for many years afterwards he must support himself on other resources, until his practice affords an income. A certain amount of capital is, therefore, as necessary to a Physician as it is to a merchant, and a man who attempts the "perpendicular ascent," without possessing sufficient ballast to counteract the centre of gravity, may expect a perpendicular fall.

The General Practitioner obtains his qualification at the age of twenty-two. He escapes four years of expensive education. As soon as he has passed his examination he takes a surgery or a shop, and his returns, though at first small, are immediate and progressive. The pence and the shillings accumulate, while the Physician, at the same age, is expending his pounds in completing his education. At the age of twenty-six the General Practitioner is in full practice; the M.D. is only just launched in his profession, and may, probably, wait months, if not years, for his first guinea. The ascent of the General Practitioner being oblique and gradual is comparatively easy, and if successful in practice he naturally aspires to a higher station than that which his original qualification has given him. He disposes of his shop, takes his degree, and rises from the position of a tradesman to that of a professional man.

This, with one exception, is the rational course, founded upon a proper organization of the profession, and the only amendment which we would suggest is the emancipation of medical men from trade. The General Practitioner, instead of living by means of his shop, should receive small fees and write prescriptions. The Chemist, instead of giving advice across the counter, should send patients to the General Practitioner. As long as medical men continue to be tradesmen, Chemists will be "doctors" in spite of County Courts, Medical Bills, Lancets, and Protection Societies.

The "injured and insulted thousands of Practitioners,"—"the rank-and-file men,"—the levellers of the citadels in Pall Mall and Lincoln's-inn Fields, are not satisfied with usurping the pence of the Druggist, they aspire to the dignity and rank of the Physician and pure Surgeon. Ambition is laudable; but instead of acting on the impulse of that ambition, and raising themselves to the desired rank, they lie on their backs and bellow lustily for an Act of Parliament to lift them up.

Those who contend that a General Practitioner is intrinsically superior to a Physician and a Surgeon, should not rest satisfied with declamation. If there be a man among them possessing universality of talent—a Sydenham in Medicine, a Liston in Surgery, a Crichton in everything—let him win the two citadels by merit, and stand like a great Colossus of Rhodes, with one foot upon each. Or if he desire to embrace Pharmacy and other

collateral pursuits within his curriculum, he may emulate the equestrians at Astley's, and ride five hobbies at once.

Until this phenomenon makes his appearance, it would be unwise to discard the principle of organization and the division of labour, which is adapted to the general capacity of mankind, and it would be premature to frame an Act of Parliament to suit the particular case of a man as yet unborn.

RETROSPECT AND PRESENT CONDITION OF THE PHARMACEUTICAL SOCIETY.

In the *Pharmaceutical Journal* for January, 1849, the Council published a statement of the number of defaulters, with the result of a circular which had recently been issued. To prevent any misapprehension on the subject, the Editor offered some explanatory remarks in a leading article, showing that although the number of defaulters during five years, ending January 1st, 1849, was 670, the number of Members admitted during that period was 720, and that of the 670 defaulters, 234 might be accounted for by death and other casualties, consequently the number of defaulters in the strict sense of the term was only 496, while the accession of new Members was 720, giving a balance of 224 in favour of the Society—the total number of Members being 1677, besides Associates and Apprentices.

This explanation, which was considered very satisfactory, appears to have been overlooked by some of our Members, who, from a hasty glance at the black list, seem to have jumped at the conclusion that the Society was falling off, which apprehension occasioned a hesitation in the minds of some as to the propriety or utility of continuing their support. Although these doubts did not amount to a panic, it is nevertheless important to take an early opportunity of correcting any erroneous impressions of this description, by giving publicity to the facts of the case. We all know that a trifling accident may occasionally produce very unexpected results. In the year 1825, we have heard that an old woman falling down in the street opposite the door of a banker, caused a run upon the bank. Several persons rushed forward to assist the lady, others collected from curiosity, and the crowd, having been seen at the door of the bankers gave rise to the report that the bank had stopped payment. Another instance is furnished in the recent unfortunate accident in the theatre at Glasgow. A man lighted his pipe, a spark fell on the floor, the cry of fire was raised, which caused a rush to the staircase, and seventy-five persons were crushed to death in the endeavour to save their lives, when the danger apprehended was altogether imaginary.

On taking a review of the progress of the Pharmaceutical

Society since its commencement, we feel convinced that it is only necessary to give a plain unvarnished account of its past and present position, in order to satisfy the minds of those who may have entertained doubts as to its utility, or fears respecting its future prosperity. It is not at all surprising that Members residing at a distance from the centre of action, and therefore not cognisant of what is in progress, should, during the intervals between the official reports, relax in some degree in their zeal, from the apprehension that the machinery is not in motion. We are therefore glad to take every opportunity that may present itself of giving information to our brethren respecting the proceedings of the Society, and other events in which their welfare is concerned.

We subjoin a report of

A Meeting *of the* Local Members of the Pharmaceutical Society, *held at the Assembly Rooms*, Newcastle-on-Tyne, *on Tuesday, March* 13*th*. Mr. James Gilpin *in the Chair*.

Present — Messrs. W. Procter, Anthony Nichol, John Colman, C. Garbutt, W. Gibson, Mathew Lee, H. Monro, G. Bustin, W. Swan, Benj. Gilpin, W. H. Walker, W. Procter, jun., R. J. Mays, R. S. Gilpin, John W. Bell, F. H. Marshall, T. B. Rhodes, R. D. Mease, John Mease, Jacob Bell, besides several visitors.

The Chairman, in opening the meeting observed, that not being accustomed to make long speeches, he should not occupy the time of the meeting, but refer to Mr. Jacob Bell, at whose suggestion it had been convened.

Mr. Jacob Bell stated that, at the last meeting of the Council in London, a letter from Mr. Gibson, the secretary at Newcastle, had been read, expressing dissatisfaction on the part of the Members in that locality, who entertained the idea that the Council were inactive, and that the Society was making no progress, which prevalent impression had produced a serious effect, and he feared that many of the Members would withdraw from the Society in consequence. Conceiving that a verbal statement would be more effectual than a written communication, and having on previous occasions travelled as an advocate of Pharmaceutical reform with a satisfactory result, Mr. Bell had suggested to Mr. Challoner, with whom he had corresponded at the time of the formation of the Society, that a meeting of the Members at Newcastle might probably be useful, and he was glad that the suggestion had been adopted, which gave him the opportunity of furnishing to his brethren a full explanation of the objects, progress, and prospects of the Pharmaceutical Society. In order to give a correct idea of what had been done, it was requisite to advert to the circumstances which had led to the establishment of the Society, and then to notice a few of the more important proceedings (of which the following is a short abstract.)

In February, 1841, the Chemists in London were thrown into a state of consternation by the introduction of a Bill into Parliament which was calculated to inflict a severe injury on the trade, and among other evils imposing severe restrictions, and subjecting Chemists to penalties for any act which could be construed into giving advice. Although repudiating the idea of acting as Medical Practitioners, it would be

impossible to carry on the business of a Chemist in the face of such an Act as that above alluded to without continual annoyance, prosecutions, and penalties. The Bill having been thrown out in consequence of the determined opposition of the London Chemists, it was thought desirable to establish a Society for the general protection of the body at large, for the advancement of education, and for other purposes. On the 1st of June, 1841, the Society was established, during the following year it was completely organized, and the Council of the Society became the acting representatives of the trade, ready to come forward in all cases in which the interests of the Members were concerned.

In March, 1843, informations were laid against many Chemists for selling spirit of wine, and the Council applied to the Board of Excise, representing the hardship of the case. Although the redress obtained was not so complete as could have been desired, the state of the law was clearly explained, and information was circulated to the Members at large, who were by this means warned of the danger and thus enabled to escape the penalties. During the same year informations were laid under the Medicine Stamp Act, and the Council acted in a similar manner, by which means many penalties were mitigated, and some remitted, full information being circulated on the subject. In the absence of such means of communication, the Members would only become aware of the proceedings of the informers by each in turn becoming a victim of the persecution. The last number of the *Pharmaceutical Journal* contained a case in point: A Chemist at Leeds had been threatened with a penalty of £10, for an offence under the Medicine Stamp Act, of which he was innocent, and yet he had no means of meeting the charge for want of evidence; but by sending a statement of his case to Mr. Bell, application was made to Somerset House, the fraud of the informer was exposed, and the penalty remitted. (See Vol. viii., No. 9, page 409.)

During the last four years several Bills have been introduced into Parliament, some of which would have been injurious to Chemists. The prompt measures adopted by the Council, backed by petitions from the Members at large, have warded off the evil. The question continues to be the subject of agitation in the House of Commons, and the Apothecaries are about to raise a £500 fighting fund for the protection of their interests. The Chemists must be on the alert, or they would have reason to regret their inactivity. The Council are always on the look out, and in case of any emergency, the machinery of the Society could be brought into active operation in opposing any injurious measure. In September, 1846, the Spirit Licence and Duties Bill was introduced, the effect of which would have been to place Chemists under the Excise, inflicting the payment of two guineas a year for a licence, and subjecting them to a most complicated system of stock-taking and supervision in reference to all preparations containing spirit. This Bill had passed the second reading and the committee, and it seemed almost hopeless to oppose it; but by the active exertions made on that occasion, with the aid of the Society, all the objectionable parts of the Bill had been struck out, among which was the tax of two guineas a year. Yet some Members appeared to think it a hardship to pay a guinea a year to support a Society which had already saved them two guineas. The institution was, in fact, like an insurance office; most persons pay several pounds

a year for insuring their houses—they continue this payment for years without receiving one farthing from the office—and why? Because they know not how soon a fire may occur, and then they would be glad to have an insurance-office to fall back upon. Members in the country may fancy that nothing is done, because they are not on the spot; in like manner a passenger on board a steam-boat might go to sleep in his cabin, and in the morning decline to pay his passage-money because the vessel was not in port. The captain would naturally say, "I have been at the helm, the crew have been at their posts, while you have been asleep. We shall bring the vessel into port as soon as wind aud tide permit, provided you do your part by furnishing the sinews of war, without which we cannot keep the steam up."

It has been said that the Society is of no use to Members in the country. This is a great mistake; for suppose any Member in a small town to be a victim of persecution in any matter affecting the Members generally, what power or influence could he have to resist it by himself? None at all; but by placing his case before the Council he has the advantage of the collective influence and experience of the whole body in his defence. The Benevolent Fund also should not be forgotten, this being designed for the benefit of Members and Associates in cases of unforseen calamity. These are what may be termed the pounds, shillings, and pence arguments; but there are other arguments which, to those who feel a laudable pride in the character of their profession, are no less important, namely, the arguments which relate to education and the elevation of the standing of the body. It has been said that it is unfair to tax the Members in the country to aid in supporting a School of Pharmacy in London, which costs £400 or £500 a year. Here, again, it is only needful to explain the fact in order to refute the argument. A Chemist in the country desires to educate his son, what means has he at home of giving him a first-rate education? He may send him to London for a year to the School of Pharmacy, and at an expense much less than an apprentice fee, he finds him on his return an acquisition to his business and a credit to his family. Those who do not in this way derive direct benefit from the School, participate indirectly in the advantage by the superior character given to the body, which is reflected on all its Members. Before the establishment of the Society, the English Chemists were considered by their brethren on the Continent an inferior race. They had done nothing for science—they had no pretensions to Pharmaceutical education—they were little more than Druggists, not known as a body and not heard of as individuals. Within a few years the fame of the Society has spread throughout Europe, and the English Chemists now enjoy a fair share of credit. Every year is raising their character, and placing them in a rank more like that of the Chemists in France and Germany, who are received in society as men of education and refinement. It is education which gives influence, position, and respectability. The progress of the Pharmaceutical Society has been observed with surprise by the medical profession in this country, for while they have wasted their labour in fruitless contests among each other, the Chemists are the only body connected with the profession who have made any real progress towards the attainment of the desired reform.

Mr. Bell, in conclusion, exposed the fallacy of the idea which some

Members in the country had entertained, namely, that the Society was beneficial chiefly to those Members in London who took an active part in the management. On the contrary, it was a great and often an inconvenient tax upon their time, and they sometimes found it requisite to put their hands in their pockets: as for example, at the dinner which took place for the benefit of the Benevolent Fund, when nearly £800 was collected, the bulk of which was subscribed by London Members. He felt sure that in case of need they would never be found wanting when liberality might be required for any important object. He had himself been originally induced to take up the subject at the earnest solicitation of some of his brethren at the time the meeting was held to oppose the Bill of Mr. Hawes in 1841. In the first instance, he declined to interfere, observing that he had no time to spare, and was not likely to be affected by the Bill. But on being informed that the Bill would seriously injure many Chemists, especially those in a small way of business, he had consented to join in the undertaking. Having embarked in it, and having seen the importance of unity, and the advantage likely to be derived from the measures adopted, he was determined to persevere until an Act of Parliament had been obtained for the protection and improvement of the body of which he was a member, whatever might be the labour or expense attending the undertaking.

Some Members present inquired of the Secretary what was the nature of the complaint which he had made, and on whose authority he had written to express dissatisfaction. Mr. Gibson replied that he had written for information, in order to be prepared with an answer for those who had an idea that the Society was making no progress, and he had reported the sentiments which he had heard expressed when calling for the subscriptions. Some Members present confirmed the statement as to the existence of some dissatisfaction, but others expressed surprise at the circumstance. After some further discussion, the following Resolutions were unanimously adopted:—

Moved by Mr. C. Garbutt; *seconded by* Mr. Walker Swan,

"That this meeting having heard Mr. Jacob Bell's elucidation of the proceedings and prospects of the Pharmaceutical Society, cordially approve of the acts of the Council, and pledge themselves to give their utmost support to the Society, and to endeavour to obtain an accession of Members."

Mr. Challoner moved "a vote of Thanks to Mr. Bell."

Mr. Procter, in seconding the resolution, observed, that he had been a warm supporter of the Society from its commencement, and he should not desert the old ship so long as there were two planks left on which to float. He trusted that those who had taken an active part in the affairs of the Society would long live to enjoy the satisfaction of observing the fruits of their labours. He thought that if all the Members and Non-members who were dissatisfied had been present at the meeting they would have altered their opinion.

Moved by Mr. Colman; *seconded by* Mr. Swan,

"That the resolutions and report of the meeting be advertised in the *Newcastle Courant and Gateshead Observer*."

Moved by Mr. Anthony Nichol; *seconded by* Mr. Bustin,

"That the Thanks of this meeting are due to the Chairman."

THE MEDICINE STAMP ACT.

Just after going to press last month, the following letter was received by the Editor:—

"*Stamps and Taxes, London,*
"*27th February*, 1849.

"Sir,—The Commissioners of this Revenue having had under their consideration the explanation given by you relative to the information lodged at this office, and referred to in my letter of the 24th ultimo to Mr. James Sewell, of Leeds, are pleased to direct that no proceedings be instituted against him in respect thereof.

"I am, your obedient Servant,
"J. Timm,
"*Solicitor for Stamps and Taxes.*"

A similar letter was also received by Mr. Sewell.

Although the result of this case was satisfactory, one important part of the investigation remained incomplete, namely, the mode in which the delinquent was to be dealt with by the Commissioners of Stamps. On this point we have made particular inquiry, and are informed that the individual is dismissed from office, and prohibited from ever again acting in his odious capacity of informer and swindler. We understand that he is a man who, from his appearance, might be mistaken for a gentleman; that he had been a surgeon's assistant, which accounts for his aptitude in preparing spurious medicines for enclosure in the shop-bills of those on whom he practised his black arts. He was detected in several other cases, but the evidence was not sufficiently conclusive to justify a prosecution. The plan he adopted was to introduce himself to the agents of the Commissioners of Stamps in the country as a person accustomed to act in the capacity of informer, charging a high price for his services, and occasionally extorting, or attempting to extort, money from the defendants under the pretence of obtaining an acquittal. In the cases which have been exposed the bribe was not given. Those who paid the money were not likely to blow the trumpet afterwards. Having done his worst at Leeds, he proceeded to Norwich and other places, but measures have been taken to prevent a repetition, his name having been discarded from the list of informers.

During the investigation of this case, a question has arisen respecting the sale of the remedies recommended by the Board of Health for the prevention or cure of the cholera. It has been questioned whether such remedies, being ordered officially for general use, ought or ought not to be stamped. This depends on the manner in which they are offered to the public. Any Chemist may sell these remedies in the same manner as the preparations of the Pharmacopœia, without stamps, provided they are sold on their own merits on official authority. But if a Chemist reprint the general instructions with his name on the bill, or if he sell the medicines with extracts from the circular on labels or handbills, with his name by way of recommendation, he must affix a stamp. On the same principle tincture of rhubarb, compound tincture of camphor, or any other preparation, would require a stamp if sold with a recommendatory label.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

LECTURE
ON ELECTRICITY AS A SOURCE OF LIGHT.

BY THEOPHILUS REDWOOD, ESQ.

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(*Delivered on the 14th March.*)

The practical application of Electricity for the production of light, has repeatedly been suggested as a result likely to occur among the improvements and new applications of which this branch of science has recently been so prolific; and the realization of this suggestion would perhaps be no greater triumph to the cause of science in the present day, than was that achieved some years ago by the introduction of coal gas for a similar purpose. The electric light has been known and frequently exhibited for many years past; its purity and intensity have claimed the admiration of all beholders, and several schemes have been devised for making it available for use; but some formidable difficulties have presented themselves, which have hitherto prevented the employment of the galvanic battery as a substitute for gas works.

Within the last few months, this subject has acquired new and increased interest, from the announcement of a plan by which it is proposed to render electricity generally and economically applicable as a source of light. We are told, that ere long, our streets and houses will exchange the jaundiced light of gas and candles, for the brilliant spark which rivals the sun itself in the purity and force of its illuminating power. Several patents have already been taken out for the arrangements by which this object is to be accomplished. Companies have been projected for raising the "one thing needful," and the doubts of some of the incredulous have been quieted by the exhibition of a splendid and tolerably permanent electric light. Moreover, the projectors of this patented scheme assert, that they can get their light for nothing.

Now, it is the object of this evening's lecture to furnish an explanation of what has heretofore been accomplished, and what is now proposed to be done, with reference to the application of electricity as a source of light.

Before entering upon these specific questions, however, it may be well to premise a few observations on the nature of light, the sources from which it is derived, and electricity as one of these sources.

Light may be briefly described as the force or agent by which we are enabled to receive impressions from external objects through the organs of sight. It produces upon the retina of the eye the sensation of vision. Some philosophers have considered light to be a distinct form of matter, thrown out or radiated from luminous objects, and absorbed, reflected, or transmitted, in various degrees, by those substances upon which it falls. This notion of the nature of light is

called the *corpuscular theory*. By others, however, light is viewed, not as a separate form, but merely as a condition—a state of vibration or motion—of matter. This is called the *undulatory theory*, and among those who adopt it, there are some who assume that the motions or vibrations causing the phenomena of light, are confined to a distinct kind of matter—an imponderable ethereal fluid, of extreme tenuity, which pervades all space;—while others are inclined to reject this notion, and to consider light as a specific condition or state of motion of ordinary matter.

We have one great natural source of light—the sun, from which we are illuminated in the day by direct radiation, and partially lighted at night by reflexion. But civilized and luxurious man receives the light of day with closed eyes, and delights to revel in a light of his own production. Hence artificial light has become one of the necessaries of civilized society.

It does not come within my object, on the present occasion, to trace the progress which has been made in the improvement of the means for effecting artificial illumination. Suffice it to say, that all the methods of producing light that we are accustomed to employ, are dependent on the chemical combination of bodies. The emission of light by a candle or a gas-lamp, is one of the phenomena attending the combination of the elements of the candle or of the gas with the oxygen of the surrounding air. In these cases, light results from chemical combination. It is *one* of the attendant phenomena, the production of a new body—a chemical compound—and the development of heat, being other phenomena simultaneously occuring.

We have reason to believe that the development of heat always accompanies chemical combination, but we cannot assert this of light. On the contrary, the same bodies may be made to combine, in one case *with*, and in another case *without*, the development of light. Thus, a mixture of oxygen and hydrogen gases will combine *with the evolution of light* if a little spongy platinum be introduced into the mixture; and they will combine *without light*, if the platinum before its introduction be mixed with some clay. In both cases heat is developed, and water is formed as the product of the combination; but in one case we have the further phenomenon of light, in the other we have it not. Where the light occurs, the combination is instantaneous, while in the other case it is slow and gradual.

For the production of light by chemical combination, it is generally, not always, necessary, that the combination should be active and energetic, and that it should be accompanied by a considerable development of heat. The exceptions are in the several cases of phosphorescence, where the combination is slow, and the evolution of heat almost, if not quite, imperceptible. When heat and light are freely developed on the occurrence of chemical combination, the aggregate effect constitutes the phenomenon of *combustion* in the ordinary sense of this term.

It is by combustion that light is usually produced artificially, and all the means hitherto employed for effecting nocturnal illumination are founded upon this application of chemical affinity.

But light may be produced independently of combustion,—as for instance, where a body becomes luminous from the accumulation of heat. Cases of this kind may occur in which light is evolved in

abundance, and yet no chemical combination takes place. Thus, a piece of metal may be made first hot, and ultimately luminous, by hammering it, or by continued friction, neither the heat nor the light resulting from any chemical action. Bodies which are thus luminous from the accumulation of heat, are said to be *incandescent*.

In effecting combustion as a source of light, it is found necessary that the flame should contain solid matter in a state of *incandescence*. Flame properly results from the combustion of bodies in the state of gas or vapour, and when the whole of the matter present is in this state, the light emitted is generally very feeble.

This is well illustrated in the case of the oxy-hydrogen flame, which of itself emits very little light; yet we have here two bodies combining under the influence of a powerful affinity. The *combustion* is perfect, the *heat* developed is intense, but the *light* is insignificant, and this arises from the fact that there are no solid *incandescent* particles present. We can fuse the most intractable metals, such as platinum, in this flame, and effect the vivid combustion of more oxidizable metals, such as iron or copper, and while these bodies are kept in the flame, the luminous effects are greatly increased. But the greatest amount of luminosity that the oxy-hydrogen flame is capable of producing, results from the incandescence of lime placed in the jet of burning gas. The light thus produced is not inferior in quality to the electric light, nay, it is, perhaps, even more perfect.

In the production of a *luminous flame* by the combustion of oil or gas, we have similar conditions to fulfil to those which are so efficiently realised in the oxy-hydrogen lime-light. We have to bring two gaseous bodies into contact which are capable of combining at an elevated temperature with evolution of heat and light, and the arrangement of apparatus must be such that one of the constituents of the combustible matter, namely, the *carbon*, shall, during the process of combustion, be eliminated in the solid state, and become incandescent in one part of the flame, producing there the greatest amount of light, and then unite with oxygen, and pass off in a state of combination as it quits the sphere of activity. If carbon be not thus eliminated and rendered incandescent, the combustion may be perfect, and yet comparatively little light will be produced; or if, after the elimination of the carbon, it does not ultimately undergo combustion, it will pass into the atmosphere in the state of smoke.

(These results were illustrated by one of Mr. Leslie's gas burners, to which three of his glasses (combustion chambers) were successively attached, the cock supplying the gas being left unaltered. When the combustion chamber adapted for the quantity of gas supplied (four feet per minute) was placed over the burner, a beautiful luminous flame, unaccompanied by smoke, was obtained. On replacing the combustion chamber by another which supplied more air to the flame, the light was diminished to about one-half, although the quantity of gas consumed was rather increased. This combustion chamber was then removed, and one supplying less air than that first used was substituted for it, when the flame immediately became smoky. It thus appeared that the same quantity of gas might be consumed with the production of very different amounts of light.)

Such are the conditions essential to the production of light by com-

bustion, for the fulfilment of which so many modifications have been introduced in the construction of lamps.

We certainly have abundant means in the present day for obtaining good and cheap light, as compared with that of the days of mould-candles; yet all these means, dependent on combustion, are subject to certain objections, which become magnified as we advance in the refinements of art and with the progress of science.

We begin to find that lamps, even of the best construction, and candles, even of the purest wax, afford but imperfect light; that the combustion of wax, of oil, and of coal gas, as sources of light, is extravagant waste of valuable substances, the worthless products of which tend to vitiate the atmospheres of our houses, and to injure the health of the inmates.

The active votaries of science, ever ready to apply its resources in remedying acknowledged abuses, have endeavoured to apply a remedy here.

What is the object we seek to attain? The means of producing Light,—pure in quality, available at will in any required quantity, and applicable where required, without prejudice to the condition of the surrounding atmosphere.

And how is this object to be attained? It has been asserted that it is attainable through the medium of *electricity*.

Some years ago, when the knowledge of electricity extended only to the means of drawing faint sparks from the surface of excited glass, or more recently, when the lightning which illumines the darkness of the tempest, was proved to be an electrical discharge, as momentary in its duration as it is fearful and uncontrollable in its progress,—the announcement that this subtle agent might be made available as a constant, controllable, and economical source of light, would probably have excited a smile of incredulity from even the most sanguine of the speculators in scientific wonders.

But the announcement is no longer startling. To excited glass or resin, and the thunder cloud, we have added the galvanic battery as a source of electricity. By means of this apparatus, perfectly simple in construction, yet wonderful in its powers, we are enabled to command as much electricity as would supply a hundred thunder claps, rending the air with lightning; yet we here have it obedient to our call, and perfectly controllable while in action, ready to come forth, either as *an invisible agent*, travelling with a speed of 200,000 miles or more in a second of time, and exerting powerful influences upon different forms of matter, or in the character of *fire*, melting the most intractable of metals, and producing, under particular circumstances, *a splendid light*.

It is this kind of electricity,—the electricity of the galvanic battery, that has been proposed to be applied for the purposes of illumination.

And here we may profitably enquire, *what is this electricity?—whence does it originate?—and how is it produced?*

In answer to the first of these questions, we might represent electricity as a force or power closely allied to, if not identical with, chemical affinity, or the power which causes bodies to enter into chemical combination;—or, in accordance with the views of some philosophers, it might be represented as a specific mode of action of a certain force

or power, which otherwise manifests itself as *chemical affinity*, or *heat*, or *light*, or *magnetism*.—Or again, it might be stated, in the words of Mr. Grove, that "*heat, light, electricity, magnetism, chemical affinity*, and *motion*, are correlative, or have a reciprocal dependence. That neither taken abstractedly, can be said to be the essential or proximate cause of the others, but that either may, as a force, produce or be convertible into the other."

Now, these are mere speculative notions, on a subject with reference to which we have no means of obtaining any very precise knowledge. They tend to show, however, that there are certain indications observable of the existence of a very close relation between the different forms of physical forces, and with this view only I adduce them.

But whence does this power originate, and how is it produced or put into action? It originates, as far as concerns its immediate development in the galvanic battery, from chemical combination and decomposition. It is produced or put into action by the decomposition of a liquid, and the combination of one of its elements with a metal.

Electricity indeed, is put into action, in every case of chemical combination or decomposition, but it is not in every case of this kind that we get what is commonly called an electric current,—that is to say, that we get manifestations of the force at a distance from the point at which the chemical action occurs. When the phenomena are all confined to one locality, they are said to be *purely chemical*; but when some of the phenomena are transferred to a distance from the point at which the chemical action occurs, the effect is said to be *electro-chemical*—electricity being, under these circumstances, the force or one of the forces transferred.

Now, the conditions essential to the transference of part of the force which is put into activity by the chemical combination or decomposition of bodies in the battery, appear to be, that two conductors of electricity shall be simultaneously exposed to the action of a compound liquid, for some of the elements of which one of the conductors has a stronger affinity than the other has, or by which this conductor is more easily acted upon than the other.

The conductors must be separated from each other in the liquid, and connected by a conductor of electricity out of the liquid. This arrangement constitutes a *voltaic or galvanic circuit*, and a combination of two or more alternations of the conductors and exciting liquid, constitutes the *voltaic or galvanic battery*.

It appears then, that this is a different method or arrangement for developing the force or forces involved in the act of combination or decomposition of bodies, rather than a method of exciting a distinct force different from those which accompany ordinary combustion or other cases of chemical combination.

In the flame of a candle we may assume that we have all the force or forces in operation, which are more distinctly and separately developed by the galvanic battery. We have decomposition of the wax or tallow, and combination of some of its elements with the oxygen of the surrounding air, heat and light being at the same time developed.

In the voltaic circuit we have decomposition of water, or of an acid or saline compound, and combination of one of the elements with a

metal, electricity, heat and light, being under particular circumstances developed.

In the latter case, the heat and light may be manifested at a distance from the primary point of action, and certain properties, which are called electrical, are observed in and around the conductor by which the effects are transferred. The absence of these observed electrical properties, and the local character of all the phenomena, in the case of ordinary combustion, are the features by which it is distinguished from the action and effects of the galvanic battery. This difference, however, is probably not such as to constitute an essential distinction in the nature of the actions and of the forces involved in the two cases.

It is universally admitted that all bodies which combine chemically, are, in relation to each other, in opposite electrical conditions. In the oxy-hydrogen flame, the two gases which combine, are, one *positive*, and the other *negative*, in their electrical relations, just as the zinc and the oxygen of the water are in the galvanic cell. In the flame, however, these opposite electricities at once combine and neutralize each other, but in the cell they are separated, transferred away in opposite directions through a line of particles of matter, and the effects resulting from their combination may be developed at a distance.

Now, I do not mean to assert that the evolution of heat and light in the oxy-hydrogen or other flame, and the similar phenomena occurring in the connecting wire of the battery, are both caused by the combination of the two opposite electricities, and yet some arguments may be adduced in favour of this view.

I have already shown that the oxygen and hydrogen may be made to combine either with or without the production of light.

We here have them in a state of combustion (the oxy-hydrogen blow-pipe flame) we say the opposite electricities are at once neutralized; we find that the effects, including *heat and light*, are local.

In this apparatus (Grove's gas battery) the same gases are combining, but the arrangement is such that light is not evolved where the chemical action occurs; part of the force is now transferred; we get an electrical current, and may develop heat and light at a distance.

Again, it is well known, that if charcoal be thrown into fused nitre at an elevated temperature, the former will undergo vivid combustion at the expense of the oxygen of the nitric acid—heat and light being evolved. If, however, the temperature be not much more than sufficient to keep the nitre in a state of fusion, on introducing the charcoal, combination will take place, but without the evolution of light.

If in performing this experiment, the nitre be fused in a platinum crucible, connected with one of the wires of a galvanometer, while the charcoal is attached to the other wire, on plunging the charcoal into the fused salt, if combination takes place without light, there will be an electrical current, whereas, if the heat of the nitre be such that vivid combustion occurs, the electricity will not be developed in the wire.

This view may perhaps be strengthened by referring to the influence of *magnetism on flame*. But in doing this, let us first briefly consider the mutual influences of electricity on magnetism, and of magnetism on electricity. In the last experiment, we observed that when a current of

electricity is carried near to a magnetic needle, the latter is deflected from its usual direction, as influenced by the magnetism of the earth, and points across the line of the electric current. So, in like manner, if the magnet were fixed in its position, and the wire conducting the electricity were free to move, the latter would take a position at right angles with that of the magnet. In fact, the lines or directions of electric and of magnetic force will be tangential to each other.

Now, if the flame of a candle be placed between the poles of a powerful magnet, the flame will assume a peculiar form and position, spreading itself out like a *fish-tail flame*, in the direction which would be taken by an electric current under similar circumstances.

I do not wish to lay any particular stress upon this result, for it has been explained without any reference to the existence of electric currents in the flame. It forms, however, one of the facts which may be adduced as indicating a relation between ordinary combustion and electrical phenomena.

But now to return to the battery—this is the source of our electrical power. We here have chemical combination and decomposition going on. Without this action we can get no electricity, and the quantity of electricity that we get will depend upon the extent of the chemical action in the battery.

The battery contains two solid conductors, which are generally both metallic, but sometimes charcoal is used as one of the conductors. These conductors are immersed in a liquid, which is generally an acid. One of the conductors must enter into combination with some of the elements of the exciting liquid, and the other conductor should remain passive. The metal zinc constitutes the conductor, which enters into combination in all the best forms of galvanic battery. Practically, then, we derive our electricity in the battery, from the combination of zinc with oxygen or some other element of the exciting liquid. In fact, the combination of zinc is the source of power in the battery, just as the combination of the elements of the wax or tallow is the source of power in the candle.

We have many forms of galvanic batteries, and different combinations of elements in them; but they all comprise the essential conditions which I have named. The improvements which have been made in the construction of batteries, relate chiefly to the means of increasing the constancy and uniformity of the power. The power is also, no doubt, economised in the improved forms of battery, the irregularity of action in the old batteries having arisen, in part, from loss or waste of power. But from no battery can we get power that is not represented in the cells by the chemical action going on there.

Thus, if I take a piece of *zinc*, and ignite it in the lamp, I get power developed equivalent to the zinc and oxygen which combine; so, in like manner, the power we get *from* the battery will be equivalent to the work done *in* the battery. In order to increase the *power*, we must increase the *work*.

Now, there are two ways of increasing the power of the battery. One consists in increasing the *quantity*, and the other the *intensity* of the electricity.

The quantity will depend (if the battery be a good one) upon the

amount of work done in each separate cell, and *the intensity* will depend upon the number of cells.

When the two plates are immersed in the exciting liquid of the cell, action commences on what is called the *positive* or *active* metal or element, and from thence the *electric current* starts. The other metal or element is not chemically acted upon, but being electro-negative in relation to the first or active element, it *induces*, or is assumed to induce, an *electro-polar* condition of the particles of the decomposable liquid, situated between the two plates, and when decomposition of such liquid takes place, it receives the positive electricity of the decomposed particles.

The more energetic the action of the exciting liquid is upon the active or positive metal, the greater will be the number of polar chains of particles, starting from a given surface of the *positive plate*, and extending through the liquid towards the negative plate, and this number will of course be increased in proportion to the extent of surface of the active metal thus acted upon by the exciting liquid.

Now, it is the *number* of these *polar chains* that determines the *quantity* of electricity in the combined current.

These polar chains are received on the negative plate, and are transmitted through the conducting wire. In the *battery*, consisting of several cells, the polar chains of one cell are continued through each of the other cells, so that there will be an equal number of *polar chains* in each cell, and also in the conductors connecting them.

The *quantity of electricity*, therefore, is represented by the amount of work done in any one cell, and not by the aggregate amount of work done in the whole of the cells.

But the electricity thus put into action, may be *considerable in quantity*, and yet very *feeble in intensity*. Now, the *intensity of the current* will depend upon the number of cells in the battery.

The distinction between *quantity* and *intensity* in an electric current, may be appreciated from the following description of Mr. Faraday's. He states that two wires, one of platinum and the other of zinc, each $\frac{1}{18}$ *of an inch* in diameter, and immersed to the depth of about half an inch in a very dilute acid, consisting of one drop of oil of vitriol, and four ounces of water, will yield *as much* electricity in about four seconds of time as an electrical battery of fifteen Leyden jars, each having 184 square inches of coated surface, and charged with a very powerful electrical machine.

It has been calculated, that the *quantity* of electricity required to heat a platinum wire, the one-hundredth of an inch in diameter, to redness for about four minutes, is equal to that of a very powerful flash of lightning.

I was not wrong, therefore, in asserting that we can command from a simple battery, such as we have here, *as much* electricity as would supply a hundred thunder-claps. The intensity of the electricity, in the two cases, however, is widely different.

Now, for the purposes which we are contemplating, it is not only necessary to have a large supply of electricity, which the galvanic battery always affords, but we must have it in a state of considerable intensity, and moreover, we must have a constant and uniform supply.

To fulfil these conditions, we require the best forms of battery.

I have here all the kinds of galvanic battery that are best suited for producing the electric light, and other effects requiring quantity, intensity, and constancy of supply. Of these, that which first deserves notice is *Daniell's constant battery*. The improvements effected by Professor Daniell in the construction of this battery may be said to have suggested or originated the principle upon which all our most powerful batteries are now constructed. In Daniell's battery, and those formed upon the same type, two exciting liquids are used, one in contact with the active, and the other in contact with the passive metal, or conductor, and these two liquids are separated by a porous diaphragm, which, while it prevents their admixture, does not intercept the continuity of the *polar chains*, and the free progress of the current.

The invention of *Daniell's battery* was a great step in the improvement of these instruments; but it was speedily followed by the introduction of *Grove's battery*, which, in this country, has now almost entirely superseded Daniell's for experimental purposes. At the present time there is no form of battery known, that combines so many good qualities as Grove's. This is the battery that is almost always used when any striking electrical effects, not excepting the electric light, are required to be exhibited. In Grove's battery, platinum is used as the negative conductor, in the place of copper, which had been previously almost always employed, and nitric acid is the electrolyte in contact with the platinum.

On the Continent, a battery, called *Bunsen's battery*, is much used, in which charcoal is substituted for platinum, the construction in other respects being similar to that of Grove's. We shall presently have an opportunity of testing the relative powers of these two batteries, of each of which I have twenty cells.

Lastly, we have a battery that has recently been a good deal used, which is called the *Maynooth battery*. The liquid elements in this battery are the same as those in Grove's and in Bunsen's, namely, nitric acid, and dilute sulphuric acid, but the negative conductor here is iron. This battery, when in good order, affords great power, as, in consequence of the cheapness of the materials, the plates are generally made of large size.

Now, for the use of these batteries. The power which is generated or put into action in the cells, is transmitted through the conducting wires, and may be developed at a distance from the source at which it originates.

If the wire be a good conductor of electricity, such as copper, and of sufficient size, while the circuit is complete, the current will pass without affording, under ordinary circumstances, any sensible indications of it. We may handle the wire through which this mighty power is circulating, and we perceive nothing unusual about it. There are means however, of getting evidence of this power. Thus, for instance, if we bring pieces of iron into the vicinity of the conducting wire, we find that they are instantly converted into magnets, attracting each other with considerable force; and if the wire be coiled round a bar of iron, a magnet of immense power will be formed.

Still the conducting wire itself presents to our senses nothing unusual. But this will only continue to be the case so long as the

connecting medium by which the two ends of the battery are united, is a good and complete conductor.

If, instead of a copper wire of large size, we use a smaller wire of some metal which is a worse conductor, we shall find that heat will be developed. Thus, platinum is a much worse conductor of electricity than copper, and if a piece of wire of this metal be made part of the circuit, it becomes heated and incandescent, so as to give out a certain amount of light. This is one method of obtaining the electric light; but the light thus developed is by no means intense, nor can we obtain it in very considerable quantity from batteries of ordinary construction. The circuit, however, being complete and uninterrupted in this arrangement, there will be no intermission in the effect produced so long as the action of the battery is uniform.

Carbon, in the state of charcoal, is a conductor of electricity, and it is by interposing this substance in the circuit of the battery that the most intense light is obtained. Pieces of hard charcoal are attached to the ends of the conducting wires, and when these are brought into complete and sufficient contact, the current of electricity passes without interruption. If, however, the contact take place at only a few points, and the current of electricity be considerable, the charcoal becomes heated and incandescent at these points, from the means of conduction being imperfect or insufficient; and on now causing the points to recede from each other, a most intense and splendid light is obtained.

(The whole of the batteries which had been charged for the occasion, namely, twenty of Grove's, twenty of Bunsen's, ten of Daniell's, and ten of the Maynooth, were united in a series for producing the light, with hard coke points, fixed in Mr. Warren de la Rue's adjusting apparatus, and an arc of light of nearly half an inch in length was thus obtained.)

This is the kind of light which has been recently exhibited as something new; but, in point of fact, it is almost as old as the discovery of galvanic electricity itself, and within the last ten or twelve years, during which time we have possessed very powerful and constant batteries, it has constituted one of the most striking exhibitions of the electrician, which has been repeated hundreds of times.

The light produced by electricity from charcoal points possesses also great purity. When decomposed by a prism, we get a spectrum similar to that afforded by the rays of the sun. The charcoal does not necessarily undergo combustion, and, therefore, while we have a pure light, the surrounding atmosphere need not be contaminated by noxious gases. The arc of light between the two points consists of a multitude of minute particles of charcoal, which are continually passing from the positive to the negative electrode in a state of incandescence. It is thus that the current of electricity is maintained, and charcoal is peculiarly adapted for affording this kind of light, because, while it is a good conducting element, the cohesion existing between its particles is not so great as to prevent the disintegration of the mass by an electric current of a certain degree of tension.

It will be observed that there is an analogy between the arc of light obtained with charcoal points, and the less intense light afforded by the incandescent platinum. In either case we have a solid conductor

of electricity interposed in a galvanic circuit, under circumstances which offer certain obstacles to the free transference of the circulating power, and heat and light are developed in consequence of this obstruction. There is, however, one marked distinction in the two cases. The platinum wire affords a constant and uninterrupted, although imperfect, conducting medium, and so long as the current of electricity is maintained, the effects will continue unaltered ; but this is not the case with the charcoal light. To obtain the light with charcoal points, the two pieces of charcoal must, in the first place, be brought into contact, so that they shall touch at a few points only, and an insufficient medium for the free transference of the electricity being thus established, the particles of charcoal through which the current passes become incandescent, just as the platinum wire does under similar circumstances. But if the charcoal points be left thus in partial contact, the heated particles, under the influence of electricity, would separate themselves from the surrounding mass, and pass in the current so as to fill up the interstices between the originally contiguous points, and a uniform and sufficient conducting medium for the current being thus established, the development of heat and light would cease. In order to maintain, and at the same time increase, the light of the incandescent charcoal, the points, after being brought into contact and ignited, are separated to a small distance from each other, the current being maintained by the disintegration of the charcoal and the projection of particles through the intervening space. The distance to which the points can be thus separated will depend upon the power of the current. A very powerful battery is required to afford an arc of light of half an inch in length.

The particles of charcoal which are carried through the arc, collect on the negative electrode in the form of powder, part of which is dissipated in the air ; and, moreover, if the charcoal be surrounded by atmospheric air or oxygen, combustion will at the same time occur. From these causes, the charcoal will be gradually wasted, and the distance between the points will be constantly subject to variation, while at the same time the action of even the best batteries is not perfectly uniform ; and therefore, after adjusting the distance of the points so as to produce a good light, the effect will last but for a short time, unless the distance be continually re-adjusted.

The inconstancy of the electric light obtained with charcoal points has hitherto prevented its application for any useful purpose, and the patents which have recently been taken out for lighting by electricity, chiefly relate to mechanical means by which the points may be kept at a uniform distance from each other, or the current of electricity re-established in case the circuit should be broken.

[The conclusion of the lecture, comprising the description of Staite's and La Molt's apparatus for adjusting the charcoal points, will be given in the next number, together with the second lecture, to be delivered on the 11th of April, on the same subject.]

ORIGINAL AND EXTRACTED ARTICLES.

ADDITIONAL REMARKS ON CHALK.

BY DR. PEREIRA, F.R.S.

I BEG leave to lay before the readers of the *Pharmaceutical Journal*, a few additional remarks on chalk, and which I was prevented from making in the last number of the *Journal* (p. 412), in consequence of the hurried manner in which my paper on this subject was prepared for the press.

In the paper referred to, I gave a list of the animalcules found by Ehrenberg in the chalk of Brighton and Gravesend. This list was taken from a table placed at the end of Ehrenberg's Memoir, and was intended to include the principal forms invisible to the naked eye.

In a previous part of his Memoir, Ehrenberg mentions nine species of calcareous Polythalamia found by him in Gravesend chalk:—*Planulina turgida, Rosalina globularis*?, *Rotalia globulosa, perforata, ornata, Textularia aciculata*?, *aspera, striata,* and *globulosa*. The most numerous individuals belonged to *Textularia aspera* and *globulosa;* but there were also many of *Rotalia globulosa* and *Planulina turgida.*

Microscopic Appearance of Gravesend Chalk.

CALCAREOUS.

β Textularia globulosa.
γ Textularia aspera, γ′ a fragment.
ϑ′ Textularia aciculata ? a fragment.
ι Rotalia globulosa, *i* a fragment.
κ Rotalia perforata.
ρ Crystalloid of the chalk.

SILICEOUS.

h Fragilaria rhabdosoma.

He also states that in the chalk of Brighton he found only six

distinct species, viz., *Planulina turgida, Rotalia globulosa, Textularia aciculata?, aspera* and *globulosa* with *Turbinulina italica?* The more predominating were the *Rotalia* and the *Planulina* with *Textularia aspera.*

For the benefit of those who may feel disposed to examine the microscopic characters of chalk, I subjoin Ehrenberg's directions, as given by Mr. Weaver in the *Annals and Magazine of Natural History,* vol. vii., p. 296, 1841 :—

"Place a drop of water upon a lamina of mica, and put into it of scraped chalk as much as will cover the fine point of a knife, spreading it out and leaving it to rest a few seconds ; then withdraw the finest particles which are suspended in the water, together with most of the water, and let the remainder become perfectly dry. Cover this remainder so spread out with Canadian balsam, and hold it over a lamp until it becomes slightly fluid without froth. A preparation thus made seldom fails, and when magnified 300 times in diameter, we see that the mass of the chalk is chiefly composed of minute well-preserved organisms. In this preparation, all the cells of the Polythalamia appear at first black, with a white central spot, which is caused by the air contained in the cells, which, as is well known, appear under water as annular black bodies ; but by degrees the balsam penetrates into all the single cells, the black rings of the air-vesicles disappear, and we recognise all the small cells of the Polythalamian animals, often presenting a very pretty appearance."

In my former paper on chalk, and to which I have above referred, I stated that "by submitting chalk and flint to a careful microscopic examination, Dr. Mantell observed not only the calcareous cases and shells of certain foraminated polythalamous cephalopods, but has even discovered the soft parts of these animalcules ;" and I further stated that I could bear testimony to the accuracy of Dr. Mantell's figure of the internal parts of a rotalia from the chalk, having, through the kindness of Dr. Mantell, myself examined them.

I have subsequently received the following letter on this subject from my friend, Mr. Henry Deane, of Clapham Common :—

"*Clapham, March 6th,* 1849.

"Dear Sir,—In your paper on Prepared Chalk, published in the *Pharmaceutical Journal* for this month (March 1849), I perceive you give Dr. Mantell the credit of having discovered the fossilized soft parts of some species of Polythalamous animals. I beg to state the discovery was made by me at the same time, and in the same piece of grey chalk, obtained from the neighbourhood of Round Down Cliff, between Folkstone and Dover, in which, in the spring of 1845, I discovered fossil *Xanthidia,* a notice of which was read, and specimens shown at the Microscopical Society a few months after in the same year. The error on your part is excusable, for on the face of Dr. Mantell's paper it would appear that *he* was the *discoverer,* and that *I* merely supplied him with the *best specimens.* Yet I can hardly conceive he meant to assert so much ; for until, at the Marquis of Northampton's, I showed him the beautiful specimens he now possesses, and has figured in his memoir, and at the same time pointed out to him their peculiar characters, which he describes, he had never seen them, nor

do I believe any one possesses a single specimen except of my own preparing.

"It unfortunately happened that my notice was not published in the current part of the Microscopical Society's Transactions for that year, and now only forms a portion of the last part of the second volume, where it is still further mis-placed, the papers having been arranged by the months without reference to the particular year in which mine was written, otherwise it would have stood first in that part, and presented not the appearance of a misprint in the year—1845 for 1847—or rather, as if it should have been 1847 instead of 1845.

"I remain, dear Sir, very truly yours,

"J. PEREIRA, ESQ., M.D. HY. DEANE."

I very much regret that in my anxiety to do justice to one friend I have inadvertently done an injustice to another. In the paper referred to, I ought certainly to have mentioned that Dr. Mantell, in his paper before referred to, states that "to Mr. Henry Deane, of Clapham Common, an able Chemist and microscopical observer, I am indebted for the most illustrative specimens." Moreover, I have to apologise to Mr. Deane for not having mentioned, in the *Pharmaceutical Journal*, that the specimens of the Polythalamous animals from the chalk, shown by the microscope at the meeting of the Pharmaceutical Society, on February 14th, were prepared and supplied by Mr. Deane. I can assure my friend that the omissions were quite accidental.

Finsbury Square, March 20, 1849.

ON THE EXTRACTION OF MANNITE FROM THE ROOT OF DANDELION (*Leontodon Taraxacum*).

BY MESSRS. T. AND H. SMITH.

With an Analysis of the Dandelion Mannite, by DR. STENHOUSE ; *being a Paper read before the Royal Society of Edinburgh,*

BY DR. WILSON,

Lecturer on Chemistry, Edinburgh, 19th February, 1849.

I BRING the following communication before the society, at the request of the Messrs. Smith, of this place, well known as the authors of several important researches in Pharmaceutical Chemistry.

They have recently had occasion to prepare, on the large scale, the preparations of dandelion root, and were led to observe that among the substances separable from the infusion of the root, was the unfermentable so-called sugar, mannite, which has not hitherto been generally included among the chemical constituents of the dandelion.

For the sake of those members of the society who do not devote themselves to Chemistry, I may here notice that mannite is a crystallizable white substance, originally known as derived from the drug manna, an exudation from several trees of the

species *Fraxinus* and *Ornus*. It is inodorous, bland, and sweet, but is distinguished from the true sugars by two characters : the one, that it is not susceptible of the vinous fermentation ; the other, that it cannot be represented in its chemical formula as a simple hydrate of carbon (C + H O), its composition being C_6 H_7 O_6, or $C_6 + 6$ H O + H.

It was obtained by Messrs. Smith, from the dandelion, by the following process :—The clear liquid obtained by the action of cold water on ninety pounds of the root, was concentrated in a vacuum-still to the consistence of a syrup. It was then at the temperature of about 150° Fahr., below which it solidified into a thick jelly, incorporated with about four gallons of rectified spirit of wine. An abundant precipitate speedily formed, consisting of albumen, pectine, and other substances, and the liquid on standing became nearly clear. Gradually, however, as the liquid cooled, beautiful arborescent clusters of crystals began to form. They slowly increased in number and size, till they eventually occupied with their spongy mass the entire capacity of the containing vessel. They were soon recognized to be mannite. The spongy mass was transferred to a cloth filter, and subjected to strong pressure, so as to separate from the crystals the bitter liquid which occupied their interstices. They were then digested in fresh alcohol, compressed anew, and the processes described repeated till the crystals had a pure sweet taste. The finely crystallized specimens were obtained by boiling alcohol on the purified mass, and passing it through a filter in a hot water funnel. In a few minutes the filtrate solidified into a spongy crystalline mass.

The Messrs. Smith believed themselves to be the discoverers of mannite as an ingredient of taraxacum, a conclusion to which they were naturally conducted by the circumstance that none even of our recent English works on Materia Medica, or Organic Chemistry, with the exception, so far as I am aware, of Dr. Christison's *Dispensatory*, recent edition, mentions mannite as derivable from the dandelion, and he simply says that "it contains mannite." In ignorance, accordingly, of any earlier researches having been made on the subject, the Messrs. Smith have investigated the subject for themselves, and have made some interesting observations to be presently detailed. They inferred that the substance which they had found was mannite, from its physical characters, which are exceedingly well marked, and, as it should seem, sufficient for its recognition. They thought it, however, desirable to have the certainty of the body they had extracted from dandelion-juice being mannite, put beyond doubt by its ultimate analysis, and at their request I submitted the substance to Dr. Stenhouse, of Glasgow, who is more familiar than probably any other of our Chemists with the chemical relations of

mannite, on which, as occuring in various *algæ*, he has published some interesting investigations. The following are the results obtained by Dr. Stenhouse, in the analysis he was good enough to make. The accepted formula for mannite is C_6 H_7 O_6, so that it should contain

Carbon	39.56
Hydrogen	7.69
Oxygen	52.75
	100.00

The dandelion mannite contained in 100 parts—

Carbon	39.58
Hydrogen	7.84
Oxygen	52.58
	100.00

The difference between the theoretical and actual results is plainly within the limits of error in analysis. In a letter with which Dr. Stenhouse has favoured me, he says, "The characters of the substance analyzed were so similar in every respect to those of mannite, that I had scarcely any doubt upon the subject from the first." This is the only analysis, so far as I am aware, which has been made of the dandelion mannite, and for its performance we are indirectly indebted to the Messrs. Smith's labours. The merit, however, of first separating mannite from the dandelion root-juice belongs to two German observers, Widnmann and Frickhinger. For a knowledge of this fact I am indebted to Dr. Christison, who was led by their researches to include mannite among the constituents of the plant under notice. Widnmann and Frickhinger's observations are contained in Buchner's *Repertorium für die Pharmacie*, for 1841 *; and those of the Pharmacien first mentioned go back to the year 1832. They appear to have identified the mannite solely by its physical characters, as no analysis of the substance is referred to. Their researches, however, which were prosecuted separately, were lengthened and elaborate, and each was led as the result of his enquiry to the conclusion, that mannite does not pre-exist in the plant, but is produced in the watery infusion of the root, by what they term "a kind of fermentation" out of the sugar, inulin, and other hydrates of carbon, which exist ready formed in the plant. The question whether mannite is an *educt* of the processes to which the root is subjected, *i. e.*, a pre-existent ingredient which is merely dissolved out of the plant by solvents such as water or alcohol; or a *product* of the transforming influence of these re-agents, which at certain

[* Widnmann's observations are contained in Buchner's *Repertorium*, vol. xliii., part 2, page 281, 1832. Frickhinger's paper, to which Dr. Buchner's remarks are appended, was published in the *Repertorium*, 2d series, vol. xxiii., part 6, pages 45 to 82. 1840. *Ed. Pharm. Journ.*]

temperatures determine its generation out of easily modified organic substances, is one of interest to Vegetable Physiology as well as to Chemistry. Dr. Buchner, in reviewing the labours of Widnmann and Frickhinger, says, in reference to their conclusion that the mannite is not pre-existent in the dandelion, "It would certainly be no useless labour to subject this result to further proof, with a view to discover, whether in any case the mannite may be found ready formed in the root; and in addition to inquire what are the causes which transmute the sugar in so simple a way, and in such quantity into mannite."—*Repertorium für die Pharmacie*, 1841, pp. 79, 80.)

The Messrs. Smith accordingly have thought it desirable to investigate this question, to which, however, it is due to them to mention, their attention had been directed before they were made aware of the researches, which had been carried on in Germany. The scale on which they have experimented, and the efficiency of the apparatus with which their trials were made, give great value to their results. Their object was to ascertain whether, by the rapid action of solvents on the fresh root, it was possible to extract from it mannite, which might in that case be regarded as a ready formed ingredient of the dandelion; and on the other hand, to observe whether the infusion of the root, if left to itself for some time, underwent fermentation, during which the mannite was developed.

With a view to secure the phenomena anticipated being witnessed on a scale which should make the experiment thoroughly crucial, two stout men provided with spades of a very convenient shape were employed to dig the roots, which they were desired to collect as rapidly as possible, so that there might be no time for the roots to become chemically altered before they were subjected to analysis. The diggers did their work so expeditiously, that in two hours they returned with eighty pounds of fresh dandelion roots. Of this quantity forty pounds were immediately comminuted, and rapidly exhausted of their more soluble constituents by cold water percolated through their divided mass. The infusion thus procured was without delay transferred to a vacuum still, concentrated to the consistence of a syrup, and thereafter mingled with alcohol. It was then left to cool, as in the successful process for the extraction of mannite from the root mentioned at the beginning of the paper.

The whole operations were so quickly managed, that from the commencement of the digging of the roots till the liquid was in full ebullition in vacuo, only six hours elapsed. From the alcoholic tincture or extract finally procured by this process not a trace of mannite could be obtained; but sugar, which readily underwent the vinous fermentation, was found in considerable quantity.

The second portion of the roots, consisting like the first of forty pounds, was comminuted and left in contact with cold water for three days. During this period, the infusion was not observed to rise in temperature ; but a constant escape of gas occurred, rising in bubbles through the liquid. The latter in addition became strongly acid, a character almost quite absent from the infusion of the previous experiment, in which also no effervescence of gas appeared. The fermenting infusion was transferred to the vacuum-still, and was otherwise treated as the former infusion had been.

The extract it afforded contained a large amount of mannite. The liquid which distilled over into the receiver was sour, and contained acetic acid. The contents of the still were also sour, probably from the presence of lactic acid.

The experiments recorded seem decidedly to warrant the conclusion that mannite does not exist ready formed in the root of the dandelion. Messrs. Smith, however, from an anxiety to obviate any fallacy which might have escaped them in the first of the two experiments just recorded, repeated it a second time with fully more despatch than before. The result was exactly the same. No mannite could be extracted from the unfermented cold infusion. But when the roots, even after the prolonged percolation of cold water through them, were left in contact with a fresh portion of that liquid for a single night, the resulting very weak infusion gave distinct though necessarily minute traces of mannite.

Messrs. Smith's observations, then, completely confirm those of Widnmann and Frickhinger, and the general statement that the dandelion "*contains*" mannite, must be changed into "yields mannite."

The inquiry, however, has a wider bearing than the mere settlement of the question, whether dandelion contains ready formed mannite or not. This saccharoid substance has been separated from the juices or exudations of the *Fraxinus ornus*, the *Eucalyptus mannifera*, the cherry, the apple, the plum, the larch ; from the root of celery, from several species of mushrooms, and of seaweeds, &c. There can be little doubt that mannite exists ready formed in some of those plants ; but the question at least requires consideration.

The dandelion infusion is not a solitary example of a vegetable juice originally free from mannite having that substance developed in it by fermentation. The attention of continental Chemists was early directed to this fact from the great losses which frequently attend the manufacture of sugar from beet-root, in consequence of the root-juice undergoing a peculiar fermentation, during which the sugar disappears, and is replaced in greater part by mannite, lactic acid, and a substance identical in composition

with gum arabic. The fermentation is sometimes called the lactic or mannite, but more frequently the mucous or viscous fermentation. It occurs spontaneously in saccharine vegetable juices, exposed to the air at a temperature between 86° and 104° Fahr., and may be produced at will in solutions of pure cane-sugar, by maintaining them at the temperature mentioned in contact with boiled yeast, the gluten of wheat, or the curd of milk.

In the natural juices, vegetable albumen, or one of the analogous azotized principles, acts as a ferment after decomposition has commenced in it, in consequence of its partial oxidation. The change is believed to be as follows :—If cane-sugar (hydrated) (C_{12} H_{11} O_{11}) be present, it is first by the appropriation of an atom of HO, converted into an hydrous grape-sugar C_{12} H_{12} O_{12}. This, by the abstraction of an atom of oxygen, yields one equivalent of mannite and one of lactic acid : thus—

Grape-sugar	C_{12} H_{12} O_{12}
Mannite..	C_6 H_7 O_6
Lactic acid	C_6 H_5 O_5
	C_{12} H_{12} O_{11}

The lost equivalent of oxygen is probably spent in oxidizing the azotized principle, which then compels the sugar to undergo the change described. Gum being isomeric with cane-sugar, an alteration of the molecular arrangement of the latter may suffice to account for its production.

The sugar which exists in the fresh dandelion is probably cane-sugar, but its exact nature has not been ascertained by any of the observers whose names I have mentioned. It is thought probable, however, by Widnmann, and the Messrs. Smith have likewise arrived at the conclusion, that the dandelion mannite is not derived solely from the sugar of the root, but also from the inulin (one of the varieties of starch) C_{24} H_{21} O_{21}, which it contains. As inulin differs from cane-sugar only by containing half an equivalent less of water ; this seems probable enough, and other members of the amylaceous or hydrate of carbon series of vegetable principles may also be supposed to be susceptible of the mannite fermentation. The question might be determined so far, by ascertaining the quantity of sugar pre-existing in the root, and comparing it with the quantity of mannite produced by fermentation. No such quantitative analyses have been made, but the Messrs. Smith, although they cannot adduce numerical data in support of their conclusion, are strongly of opinion that the proportion of sugar existing ready formed in the dandelion, is much too small to account for the large quantity of mannite derivable by fermentation from the root.

From all that has been stated it will appear, that it *may* be a question whether mannite exists ready formed in any of the vegetables that yield it; and that probably some of them, at least, afford it only as a secondary product. This is especially likely to be the case when the substance, like manna, exudes in the liquid state, and is exposed for some time to the modifying influence of the air. Should it prove in some cases, as seems likely, to be certainly produced during the life of the plant, some interesting questions may arise as to the mode of its formation, and the purpose which it serves. The azotized principle diastase, which converts starch into sugar, and is believed to play so important a part during germination, by exposure to the air acquires the power of converting sugar into mannite, gum, and lactic acid. It may after oxidation effect a similar transformation in mature plants, and be the cause of those abundant exudations of gum and manna which characterize some botanical genera. Lactic acid is not found in recent vegetables, but its place may be supplied by another acid, or none may be generated. Such speculations, however, are as yet premature.

[A beautiful specimen of mannite, obtained from the juice of Taraxacum, by the Messrs. Smith, was exhibited by Dr. Pereira, at the Conversazione of the Pharmaceutical Society, on January 17, 1849. See the *Pharmaceutical Journal* for February last, p. 368.

Messrs. Smith have subsequently forwarded to London specimens of mannite crystallized between glass plates. They are beautiful objects when examined by the polarising microscope.—*Ed. Pharm. Journ.*]

ON COATING GLASS VESSELS WITH COPPER.

BY J. B. EDWARDS, F.C.S.,

Late Chemical Assistant in the Pharmaceutical Laboratory.

While assisting Mr. Redwood last session, I had occasion to make some experiments for him on this subject, with a view to obtain the necessary data for the best process. We then succeeded in coating vessels with copper, but did not obtain that smooth, equable surface and even texture peculiar to the specimens brought from Paris.

I have lately resumed these experiments, and succeeded in obtaining many specimens equal in every respect to the French ones both in smoothness and texture.

I first tried to deposit the metal from the cyanide of copper and potassium, and with success, for that salt deposits it in a state of great smoothness and beauty. I found, however, several objections to this mode—it was troublesome, on account of

requiring an elevated temperature (from 100° to 130°.) The solution did not keep of uniform strength, as it soon became surcharged with copper which checked the operation, and though of great beauty when just finished, the coating soon changed colour, assuming a blackened appearance. I therefore again tried the sulphate, and found no difficulty occurring with that salt, if the following points are carefully attended to :—

1st. The bronze-powder must be of the best quality and finely divided—the varnish should be nearly dry before being covered with it, and after the bronze is on should be allowed to become perfectly hard and dry before it is immersed in the solution.

2nd. The battery power should be regulated by the size of the vessel to be covered. A few experiments will point out the proper size.

3rd. The solution (that recommended in *Practical Pharmacy*, page 320, answers perfectly) should be kept as constantly agitated as possible. Upon this the smoothness of the coating greatly depends.

If the liquid be kept in constant motion by syphoning from a supply vessel, and again into another receiving vessel, specimens of great beauty may be obtained.

I find the best metallic surface is obtained by first dipping the bronzed flask for a single moment into a silver solution in connection with a small battery (cyanide of silver and potassium is best), an almost imperceptible coating of silver is immediately deposited, upon which the copper takes beautifully, covering the whole surface instantaneously, instead of gradually creeping down from the connecting-wire as it does on the bronze alone. Thus a perfectly smooth and *uniform* coating is produced, which is soon covered of sufficient thickness.

I have now covered a great many vessels, and with an uniform and certain result, without difficulty, and strongly recommend to every Chemist this highly useful and economical form of apparatus.

42, *Berry Street, Liverpool, March* 10, 1849.

ON THE VOLATILITY OF FIXED SALTS IN THE VAPOUR OF WATER,

AND ON SOME OF THE PURPOSES TO WHICH THIS PROPERTY MAY BE APPLIED;

Being a Report by Messrs. Foy, Bussy, and Hurant, on a Memoir,

BY M. LAROCQUE.

One of the most remarkable facts which the study of Chemistry presents to us, is that of the volatility of certain essentially fixed substances, under the influence of the vapour of liquids in which these substances are dissolved. One of the oldest, and perhaps one of the most curious, facts of this class, is that presented by boracic acid. This acid, which is one of the most fixed bodies we know of, is volatilized in considerable quantity by the vapours escaping from the lagoons or muddy swamps of Tuscany, in

the waters of which it exists naturally in solution. For some time this fact, which from its singularity might have been expected to attract the attention and investigation of Chemists, passed unnoticed. It was only towards the year 1825 that M. Vogel made several experiments on this subject, and proved that boracic acid dissolved by acohol, became volatilized in the vapours of this liquid. In 1830 M. Saladin, Chemist at Orleans, showed in a very interesting paper, that arsenious acid, corrosive sublimate, hydrochlorate, arseniate and oxalate of ammonia, sulphur, lime, morphia, brucia, and veratria, were volatile under the influence of the vapours of water, alcohol, and ether. Since this period we are not aware of anything having been published on this subject. Nevertheless, in 1846 M. Simonin, of Nancy, read before the Society of Medicine of that town, a paper, in which he proved that a great number of fixed bodies, both organic and inorganic, were capable of being volatilized in aqueous vapours, we do not know anything further respecting this paper, which was not printed.

The work we are now about treating of not only confirms most of the facts previously stated, but greatly adds to the number of fixed substances volatile in the vapours of the liquids holding them in solution, and, indeed, generalizes this fact, for nearly all the bodies on which the author has experimented possess this property. It is but right to state that M. Larocque has always operated on large masses of products, and that the evaporation of the liquid has always taken place in the open air, and in vessels of large surface.

The substances on which M. Larocque has experimented were, in the first place, potash and soda. These two alkalies, the non-volatile character of which has caused them to be called the fixed alkalies, are volatilized in sufficient quantity to produce a violent itching of those parts of the skin exposed to the air, as also a marked irritation of the throat produced by the vapours escaping from the copper in which the evaporation takes place. After potash and soda, M. Larocque mentions phosphate of soda, the nitrates of potash and soda, and the arseniates of these two bases, and observes that the volatility under the influence of aqueous vapours of these three kinds of salts, with reference to which so close an analogy had previously been traced, unites them still more closely. Following these substances come the sulphates of zinc, of mercury, of copper, and of iron, nitrate of mercury, nitrate of silver, cyanide of potassium, the red and yellow ferruginous cyanides, the neutral tartrate of potash, and the double tartrate of potash and soda. The volatility of these salts explains, in reference to one of them, the occurrence of an ochreous incrustation of subsulphate of iron on the walls of the manufactories in which sulphate of iron is prepared on the large scale.

M. Larocque has also studied the action of heat on the solution of metallic chlorides, and he has observed that these products also possess the property of being volatilized in the vapour of water, but in various degrees. Thus, those of very volatile natures, such as the chlorides of mercury, antimony, tin, bismuth, arsenic, iron, and zinc, are volatilized in considerable quantities, whilst those which are fixed, or but slightly volatile, as the chlorides of nickel, cobalt, copper, lead, and sodium, are carried up in but a small proportion. A similar effect takes place with the iodides; but sometimes these products are decomposed, and the iodine is set free. The same observation is applicable to ammoniacal salts, of which a few, such as the hydrochlorate and the carbonate, volatilize at a temperature under that of boiling water. Indeed, several acetates, butyrates, valerianates, and formates have given the same results.

This property, which certain bodies possess of volatilizing under the influence of the vapours of the liquids in which they are dissolved, has given rise to their application for several purposes, a few of which are of some importance. M. Larocque has also endeavoured to render this pro-

perty available, and the papers and designs which have been brought before you, seem to indicate that it may possibly be used with some advantage in the manufacture of paper hangings; but, it must also be said, that further trials will be necessary in order to arrive at a satisfactory practical result.

It is by means of nitrate of silver that these papers were produced. Several other salts, under the same conditions, gave similar results, but neither of them answered the purpose so fully as the one we have just named. The following is the simple process employed by M. Larocque in the preparation of these papers. In a room in which some tables, or extended cords, are placed, some sheets of white paper are spread. In the centre of the room a porcelain capsule is placed on a furnace, and a mixture consisting of two pounds of nitric acid. sp. gr. 1.38, and one pound of water, to this is added about a pound of silver, and a gentle heat is applied. Action immediately takes place, giving rise to a considerable disengagement of binoxide of nitrogen. It is at this moment, and during the whole time of the formation of nitrous vapours that the volatilization of the silver takes place, and the designs are produced. After twenty or forty minutes of exposure, according to the shade wished for, the papers are withdrawn and replaced by others. When the solution of the silver is complete, and all re-action has ceased, the liquor is evaporated and crystallized; the nitrate of silver obtained, is used in commerce in large quantities, so that papers are thus prepared without any expense.

According to the length of time the paper is submitted to the vapours of the silver, and according to the distance from the point of emission of the vapours at which the papers are placed, so a plain coloured paper or a dotted one is obtained, the latter much resembling granite. If white designs are required, such as leaves, laces, &c., it is only necessary to place on the paper cut pieces of paper of the designs wished for before submitting it to the vapours. The Society has seen several specimens of this class, and amongst others the leaves of several plants, and some lace patterns, which were well executed.

The papers thus prepared are very strong, and they do not undergo any change by exposure to the light and air; this may readily be conceived as silver is the colouring principle. In what state does the silver exist in these papers? Is it in the metallic state, in the state of liberated oxide, or combined with organic matter? M. Larocque has made several experiments with a view to solve this question, but the results have not enabled him to decide definitively. Nevertheless, he appears to be in favour of the last opinion, for it seems to him difficult to account in any other way for the decoloration of the papers thus acted on by the simple contact of a solution of hyposulphite of soda, iodide, bromide, or cyanide of potassium. This latter salt especially, easily removes the stains, of whatever age they may be, which the nitrate of silver produces on organic tissues.

It will not be to manufacturers alone that benefit will result from M. Larocque's investigations; in analytical chemistry, toxicology, pharmacy, and, possibly, therapeutics, some useful information may be derived. Thus, the Chemist in evaporating his saline solutions, should apply a very moderate heat, if he wishes to avoid the loss of a portion of his products, especially if engaged in quantitative analysis. The toxicologist also should observe the same precautions, as inattention to this point might be attended with serious results.

The Chemist will be careful not to use alcohol or ether which have been employed in preparing extracts or products, such as vegetable alkalies, or other active principles, unless it is for the manufacture of the same preparations or analogous products. Finally, the Physician may, perhaps, combat certain maladies by agents administered in the form of vapour, having water or alcohol for their solvents.—*Journal de Pharmacie.*

BREAD FOR DIABETIC PATIENTS.

BY DR. PERCY, F.R.S.

It appears to be now generally admitted, that in the treatment of diabetes mellitus, amylaceous matter should in a greater or less degree be excluded from the diet. But, as is well known, under such restriction of food the diabetic patient soon becomes weary of the ordinary kinds of azotized matter, as beef, mutton, &c. Hence various substitutes for common bread have been proposed. Some years ago my friend, Mr. Morson, of Southampton Row, London, prepared, at my request, specimens of bread containing gluten in various proportions. However, the result was not satisfactory* ; it was only relished by the patient when it contained a considerable quantity of starch ; and when the proportion of gluten was increased beyond a certain amount, it became so tough and tenacious as to be very difficult of mastication. I have also made trial of gluten bread, brought from Paris by Mr. Morson, but with no better success. Recently Dr. Prout has published a receipt for a kind of bread devised by his patient the late Rev. J. Rigg (vide *Stomach and Renal Diseases*, 5th edit., p. 44); and this is probably the best substitute for common bread which has hitherto been proposed. Some time ago Mr. Charles F. Palmer of this town prepared for me with great care, specimens of bread from Dr. Prout's receipt; but patients to whom it was given complained of the difficulty in swallowing it, owing to the large quantity of bran which it contained. Mr. Palmer then suggested the matter of rasped potatoes, left after the complete removal of the starch by washing, to replace the bran. He carried the suggestion into practice, and produced a kind of bread which I think well deserves the attention of the profession. It has been extensively employed in the General Hospital of this town, especially by my friends Dr. James Johnstone and Dr. Fletcher, and also by several private practitioners, with decided advantage. In composition it may be considered as Mr. Rigg's bread, in which the bran has been replaced by the residual matter of the potato above-mentioned. And in the fact of its being rendered light and porous by hydrochloric acid and carbonate of soda, precisely as in the preparation of Dodson's unfermented bread, it is, as must be obvious, an expensive article ; but with many diabetic patients this will not be an object of consideration. It is improved in taste by being slightly toasted and eaten warm. I here subjoin Mr. Palmer's receipt :—

Take the ligneous matter of sixteen pounds of potatoes washed free from starch, three-quarters of a pound of mutton suet, half a pound of fresh butter, twelve eggs, half an ounce of carbonate of soda, and two ounces of dilute hydrochloric acid. This quantity to be divided into eight cakes, and in a quick oven baked until nicely browned. At first gum-arabic in sensible quantity was also introduced into this bread, on the ground of the assertion of Professor Graham, that when that substance is taken by the diabetic patient, the proportion of sugar evolved from his system is not thereby increased, and that consequently it might probably supply matter for pulmonary oxidation. However, it was found that it rendered the bread tenacious and disagreeable ; so that its use was subsequently abandoned. I wish it to be understood that whatever merit there may be in the production of this bread, it is entirely due to Mr. C. F. Palmer. My friend Dr. Evans suggests, and I think with reason, that this bread would probably be improved by the addition of a certain proportion of bran. Some gluten might also be added with advantage.—*Chemical Gazette.*

* I do not mean by this to assert, that bread deprived of a portion of its starch is not preferable to common bread for diabetic patients.

HARDENING OF GYPSUM.

It is well known that calcined gypsum, when moistened with a solution of alum, and re-calcined, acquires an increase of hardness. Keating last year recommended the employment of a solution of 1 lb. of borax in 9 lb. of water. With this solution the calcined pieces of gypsum are to be moistened, then heated to redness for six hours, and powdered. The effect is said to be still better if 1 lb. of tartar and twice as much water be added to the above solution.

From some experiments made by Erdmann it appears that Fuch's soluble glass (*Wasserglas*) is well adapted for hardening the surface of plaster of Paris figures.—*Pharmaceutisches Central Blatt*, Aug. 30, 1848.

[As some of our readers may not be acquainted with Fuch's soluble glass, we subjoin the formula for making it.—Ed. *Pharmaceutical Journal.*

Take ten parts of carbonate of potash, fifteen parts of quartz (or sand free from iron and alumina) and one part of carbon : melt them together. The addition of carbon promotes the decomposition of the carbonate of potash. The resulting mass (*silicate of potash*) is soluble in four or five parts of boiling water; the solution by evaporation yields a transparent kind of glass, which is permanent in the air, and is somewhat harder than common glass. It is composed of silica 62, potash 26, and water 12=100. Applied to wood and other objects it renders them incombustible.]

ON THE SEEDS OF THE RICINUS COMMUNIS.

BY M. CALLOND.

M. Callond has been engaged for several years in the examination of the seeds of the *Ricinus communis*, or castor-oil plant. It is well known that these seeds yield a mild purgative oil (*castor-oil*) ; but the mark from which the oil has been pressed retains an emetico-cathartic principle which the author considers to possess much interest. The castor-seeds, administered in doses of one or two drachms, either in their natural state, or made into an emulsion, generally produce hypercatharsis accompanied by vomiting. The mark or residue from which the oil has been pressed operates with nearly the same energy as the seeds in their natural state, from which it has been inferred that the mild expressed oil owes its purgative property to the presence of a minute quantity of the active principle alluded to. It has even been supposed that the purgative principle was an oleo-resinous body. M. Callond affirms that this principle possesses neither the character of an oil nor of a resin. The following are the experiments upon which this assertion is founded :—

1. After having expressed the oil from the seeds by a powerful pressure, the mark was treated with pure alcohol and the filtered liquor submitted to spontaneous evaporation. The oily residue, administered in different doses, was found to have the same action as the expressed oil.

2. After having exhausted the seeds of every thing soluble in boiling alcohol, the residual mark, when administered to the extent of seven or eight grains in a glass of sweetened water, produced nausea and salivation, which continued for more than six hours. Thirty grains, administered in two doses to a young man of strong constitution, caused vomiting, accompanied by much straining, for nearly twenty-four hours.

M. Callond is still engaged in these investigations.—*Journ. de Pharm.*

SUGAR IN WHITE OF EGG.

BY DR. BUDGE.

If the albumen be separated from the diluted white of egg by means of alcohol, and the filtered liquid mixed, according to Trommer's method, with a few drops of solution of caustic potash, and a few drops of a solution of sulphate of copper, and then heated, the liquid, which before heating was blue, becomes now brownish yellow, and after some time lets fall a sediment of the same colour. There is, therefore, sugar contained in the fluid.*

My attention was drawn to this subject by Winckler's observation that the incubated egg contains sugar of milk.—*Annalen der Chemie.*

ON A YELLOW COLOURING MATTER IN CRUDE TARTAR.

A dyer of Leipsig discovered that he could make use of a certain sort of crude tartar, which had been imported from Italy, and was, from its outward appearance, not to be distinguished from the usual sorts, for dyeing yellow; and that it was in consequence of the yellow pigment contained in it that this tartar was not applicable for every colour. A sample of it was tried with ether and alcohol, which extracted but a trace of a colouring matter. In caustic potash and caustic ammonia the tartar dissolved and yielded a dark yellowish brown colour, similar to that which the safflower assumes with potash. By maceration with carbonate of soda, the tartrate of potash could be extracted without dissolving the yellow pigment. From the impure sediment which remained behind after the application of carbonate of soda, ammonia, and especially potash ley, the pigment was extracted. On adding alum to the solution of the latter in potash, a pure and beautifully yellow coloured aluminous earth fell down. The pigment changed, however, in the potash solution from the commencement of its becoming dissolved. It is very probable that some yellow pigment had been employed for colouring the wine, which deposited, and was thus inclosed by the tartar.—*Pharmaceutisches Central Blatt,* Jan. 26, 1848.

ON THE PREPARATION OF ETHIOP'S MINERAL.

BY M. C. VOGLER.

The usual method of preparing Ethiop's mineral, consists in triturating the mercury and sulphur together in a marble or porcelain mortar. The mixture is sprinkled from time to time with water or spirit of wine while the trituration is continued, until globules of mercury can no longer be discovered by means of a magnifying glass. This process is objectionable in a practical point of view, for as the mixture becomes dry from the evaporation of the liquid employed, the dust is diffused through the atmosphere, and not only is there loss of product, but the operator suffers inconvenience from the inhalation of mercurial vapours. These evils may be obviated by adopting the following method of effecting the combination: the mercury is put into a strong stoppered bottle, with one-fourth of its weight of sulphur. These are shaken together for about two hours, more sulphur is then added, and the agitation continued until combination is completed. The process is conducted in this way in a shorter time, and with less inconvenience than that which is usually adopted.—*Archiv. der Pharmacie.*

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* This reduction of peroxide to oxide of copper merely proves the presence of a deoxidizing substance, and does not establish the existence of sugar of milk.

ANALYSIS OF NICKEL-SPEISS,

From the Nickel mine at Wisbach, near Dillenberg.

BY DR. SCHNABEL.

This substance contained 55.575 nickel; 2.925 copper; 0.600 iron; 31.975 arsenic; 7.955 sulphur; besides 0.125 of insoluble residue and 0.845 loss.—*Pharmaceutical Central Blatt*, No. 51, 1847.

THE ALNWICK BOTANICAL SOCIETY.

We have received a copy of the rules of this Society, which being concise, are subjoined entire. However unpretending may be the efforts of a little institution of this kind, such efforts ought to be encouraged, and we are glad to have the opportunity of making known the proceedings. Every country town is surrounded with plants and flowers, and the motto, "*circumspice*," adopted by the Alnwick Botanical Society would be equally applicable to many other localities.

"*President*—John Davison, Esq., M.R.C.S.; *Vice-Presidents*—Mr. H. Hunter, Mr. E. Allen, Mr. T. Walby, Mr. T. Clark; *Secretaries*—Mr. J. L. Luckley, Mr. James Heatley, jun.; *Treasurer*—Mr. E. Storer.

"RULES.

"1. This Society shall be called the *Alnwick Botanical Society*, and shall be independent of every other.

"2. Its objects shall be the full and systematic investigation of the plants indigenous to the neighbourhood; the mutual instruction of the Members; and a general study of the vegetable kingdom in all its branches.

"3. It shall consist of a President, four Vice-Presidents, two Secretaries, a Treasurer, and Honorary and Ordinary Members.

"4. The officers of the Society shall be elected by ballot on the anniversary meeting on the 24th day of January, unless such day shall fall upon a Saturday or Sunday, in which case they shall be elected on the Monday following.

"5. It shall be allowable for any person to become a Member of this Society on the payment of one shilling entrance-fee, and an annual subscription of two shillings, payable in advance; provided that such person be proposed and seconded at a general meeting, and provided that one week's notice be given of his or her desire to become a Member.

"6. If any Member shall be more than one year's subscription in arrear, he shall cease to be a Member.

"7. An herbarium shall be formed for the use and instruction of the Members, and a register of indigenous plants shall be kept by one of the Secretaries.

"8. The office of President of the Society shall not be filled by any one person for more than three years successively; but after the lapse of one year he shall be re-eligible for the office.

"9. The votes shall in all cases be taken by ballot, if any Member shall demand the same.

"10. The meetings of the Society shall be held on the evening of the first Wednesday in every month from November till March inclusive, and on every Wednesday from April till October inclusive—the chair to be taken at half-past eight o'clock precisely.

"11. No rule shall be altered unless at the anniversary meeting; and one month's notice shall be given to each and every Member of any intended alteration of any rule, or of any new general rule being desired.

"12. A subscription of two guineas entitles the donor to become an Honorary Member for life."

PHARMACY IN SPAIN.

Report on MM. Chiarlone and Mallaïna's History of Pharmacy in Spain.

BY MM. CAP AND GAULTIER DE CLAUBRY.

The authors divide their history into four epochs : the first extending from 640 before Christ to the third century of our era; the second, from the ninth to the sixteenth century ; the third, from the sixteenth to the nineteenth century. The fourth epoch comprises the nineteenth century.

We will not dwell on the first epoch, the facts of that period relate to the general history of the sciences, and those appertaining to Chemistry have been learnedly unravelled by M. Höefer. The portion of these details relating to our profession, has been compiled by one of us (M. Cap) in the *History of Pharmacy* now in course of publication, and of which the two first parts are principally devoted to the history of the pharmacy of the ancients.

The second period will appear the more interesting, inasmuch as it enlightens us as to the history of our art as practised by the Arabs.

A Jewish university established at Sara, in Asia, in the ninth century, produced some remarkable men.

In the Arabian schools of Cordova, Seville, Murcia, Saragossa, Toledo, &c., &c., the works of numerous authors are found, which are deserving of note. It is known that Abenzoar, who lived in the twelfth century, made the manufacture of syrups and electuaries his particular study—the preparation of medicines, the properties of medicinal plants, and the method of mixing them. In the fourteenth century, a work entitled *Liber Secretorum*, was written by Bubacar, in which he speaks of the salt of urine, and of a species of moon obtained in distilling urine with white clay, chalk, and carbonated organic matters, a process which greatly resembles that employed by Brandt in the 18th century to obtain phosphorus, and which might have been already known by Bubacar.

Under the government of Alonzo the Judge, in 1252, divers laws were passed relative to the practice of medicine and pharmacy ; inspections were made twice a year, from the commencement of the fourteenth century. The *fueros* of the provinces necessarily caused differences in the legal enactments, but nevertheless, a general system of organization was manifested at this period. In 1403, under the reign of D. Martin, severe laws were established relative to the sale of active preparations, and punishments were inflicted when accidents occurred from their use.

Lopez de Villalobas wrote, in 1488, when but nineteen years of age, a treatise in verse, entitled, *A Summary of Medicine*, in which he devotes numerous stanzas to purgatives, theriaca, ointments, and plasters. Towards the end of the fifteenth century, Julius Gutieris de Tolèdo wrote some interesting observations on syrups and juleps.

The first Pharmacopœia published by a Chemist was in 1497, by Pierre Benedicto Matheo, who, as is seen, wrote 159 years before Michel du Scean ; but the latter is considered by many authors, and in particular by MM. Henry and Guibourt, as being the first Chemist who had written on this art. In 1486, Saladin d'Ascala wrote his *Compendium Aromatorum*, in which he describes the conditions necessary for the preservation of medicines. He mentions the following fact, proving that the adulteration of medicines has not been confined to our times. A Chemist was fined 9,000 ducats, and deprived of his civil rights during twelve months, for having adulterated manna with sugar and starch.

Pharmacy in Spain made in the sixteenth century great advances, which the discovery of the New World must have singularly accelerated. In 1535, the College of Apothecaries of Barcelona published the *Concordia Farmacopolarum Harchinonensium*, and that of Saragossa, in 1553, the *Concordia Aromatorum*, and the *Farmacopea Cesar-Augustana*, which were complete treatises of Pharmacy, embracing all relating to that science. A

special and very lengthy code of laws relating to Pharmacy was enacted, which deserve notice on account of the remarkable regulations they contained.

We regret not being able to analyze that portion of Drs. Chiarlone and Mallaïna's work, relative to the state of Pharmacy in Spain during the third epoch ; we should have found therein curious and important details, a great part of which are quite unknown in other parts of Europe. Until the present time, little attention has been paid to the scientific literature of a people, who, in many other respects, have furnished documents of a useful nature, so that the union of many special conditions were necessary in order to investigate all that that country had produced relative to Pharmacy. The authors of the work we are analyzing were in the most favourable position for this purpose, and have gladly profited by it.

The seventeenth century again offers much that is important in the history of Spanish Pharmacy, both as regards the publication of numerous works by Chemists, and the legislation on this subject. Although much in advance of France in this respect, Spain was but very imperfectly known, the splendour of her conquests in the New World, and the importance of her wealth, attracted universal attention, and even those whose particular studies might be expected to have led them to a knowledge of the laws relative to our profession, partook of the general opinion as to the state of ignorance in the Peninsula.

We see in the eighteenth century a continuation of that movement previously given to Pharmaceutical science, and improved legislation in reference thereto, indicating here, as elsewhere, the disposition of the directing minds of that period. The number of books published, and the nature of the subjects to which they relate, are necessarily affected by the intellectual movement of this century, and in this respect Spain was not behind other nations. France has been accused—and it must be confessed not without cause—of not occupying herself sufficiently with the occurrences of other countries. German literature, and even that of England, are more *au courant* of what is publishing elsewhere than is the case in France.

A very interesting chapter of the work to which we are alluding terminates the history of the third epoch. It treats of the Pharmaceutical Colleges of Spain : we cannot refrain from giving some of the details. These establishments, anterior to all the scientific academies of Europe, existed at Valencia, Barcelona, Saragossa, Pampeluna, Madrid, Seville, Toledo, Tarragon, and in some other towns.

The College of Valencia already existed in 1327, in the reign of King D. Alphonse, who granted to the Apothecaries of this city the rights of admitting into their body all those wishing to exercise this profession. In 1441, the Apothecaries petitioned the Queen, Donna Maria of Arragon, to be allowed to constitute the College into an association for their mutual protection, and the exercise of charity to each other.

The privilege granted them orders that all Apothecaries are to use uniform weights ; it prohibits the sale, by those who have not been received by the College, of all distilled waters, excepting those of orange-flowers, rose, &c., and contains minute details as to the conditions of admission and other rules which we cannot enter upon.

In 1512, at a general meeting of Apothecaries, it was enacted that no one could be received until he had practised for eight years, instead of six, which was the former law ; and rules were established relative to the theoretical and practical examinations the candidates were to undergo. In 1601, the College published the *Farmacopea Valentina*, of which there was a new edition in 1629. The College of Barcelona existed in 1352, and published a Pharmacopœia in 1535.

The fourth epoch of Pharmacy, which includes the present century, contains less unknown details than those preceding, but nevertheless deserves

notice, especially in relation to pharmaceutical legislation, which was rendered much more perfect.

Carbonell's work translated into French, was at this period an interesting event in the history of Pharmacy ; but many other works of some interest appeared at the same time.

Although the details relating to the history of pharmaceutical literature, with reference to the period anterior to our century, are full of interest, yet those which relate to the present century leave much to be desired.

We will content ourselves with referring to two instances illustrative of this : the works of Pelletier are noticed in so incomplete a manner that it would be difficult to form any idea of them ; the names of Serrullas and Robiquet are not even found amidst those who have advanced French Pharmacy in our time. We must frankly say that this portion of the work is not nearly equal to the previous parts.

If the pharmaceutical legislation of our country has excited such numerous and legitimate reclamations, and if we are desirous of seeing it cast off that which it has inherited from past centuries, it is curious to see that Spain, which we imagine to be so much behind us, has preceded us in this respect in a remarkable manner.

At a time when the titles of nobility were a distinction to which all classes could not aspire, we are interested and surprised to find a privilege granted in 1650 by Don Philippe, placing in the same rank with Physicians all those practising Pharmacy, and declaring that they could not be admitted to the practice of any mechanical art, then looked upon as beneath that of medicine and the liberal arts.

In 1800, Don Carlos declared Pharmacy to be distinct from medicine, and formed laws relative to the examinations and inspections of Pharmacies. To be enabled to practise, the degree of bachelor and doctor of medicine was necessary in addition to that of licentiate of Pharmacy ; the inspections were made by a Physician and a Chemist, and presided over by one of the elder professors of Medicine or Pharmacy. A higher assembly was established for the faculty of Pharmacy, and charged with all the details of administration for the whole kingdom.

In 1804, the same sovereign made several modifications to the previous laws ; he established a botanical garden, and a museum of natural history in each college ; the pupils had to attend for three years, the practical and theoretical lectures of the colleges.

In order to pass from one course to another, the pupils had to undergo a severe examination on each subject of their instruction. To obtain the degree of Bachelor, they were required to lecture in Latin for half-an-hour, on one of the branches of pharmaceutical science.

The grade of Licentiate was to be obtained after two years practical exercise in the laboratories of the faculty, or in a Chemist's shop ; a theoretical examination, and one on practice, on two different days, were obligatory. After these examinations, the candidate was required to recognise and define a certain number of plants and medicines, and answer queries relative to the doses in which very powerful medicines are administered. The licentiate might practise Pharmacy throughout the kingdom. To obtain the degree of Doctor, the candidate was required to treat on any subject chosen by the College, and to answer all arguments presented to him. Some laws relating to military pharmacy completed the code.

In 1815, Ferdinand VII. remodelled the higher assembly, and extended pharmaceutical instruction, which from that time has consisted of a course of natural history, of physics, of chemistry, practical pharmacy, and of theoretical pharmacy.—*Journal de Pharmacie.*

THE MASTER AND WARDENS OF THE APOTHECARIES COMPANY AGAINST RAPHAEL LOUIS LOBO.

Before Mr. Serjeant Heath, in the County Court of Middlesex, Feb. 23, 1849.

THIS was an action brought by the Medical Protection Office, using the name of the Master, Wardens, &c., to recover from the defendant £20, which he had forfeited to the use of the Society for practising as an Apothecary, contrary to the provisions of the 55 Geo. III., c. 194.

Mr. J. O. Griffiths appeared as Counsel, and Mr. W. V. Eyre as Solicitor for the Plaintiffs. The Defendant conducted his own defence.

Mr. Griffiths.—I do not know if the defendant denies the offence.

Mr. Serjeant Heath (to defendant).—Do you deny this charge ?

The defendant replied in the negative, but took an objection to a misnomer, viz., that he was described in the summons as Robert Lewis Lobo, whereas his real name was Raphael Louis Lobo.

Mr. Serjeant Heath overruled the objection, directing the record to be amended, and that the case should proceed.

Mr. Griffiths.—May it please your Honour, I am instructed on behalf of the Master and Wardens of the Society of Apothecaries of London, who, for the first time, avail themselves of this very valuable jurisdiction to recover the penalties to which all persons illegally practising as Apothecaries render themselves liable, under the Act of Parliament under which this plaint is laid, viz., the 55 Geo. III., c. 194, by the 20th clause of which it is provided that any unqualified person acting "without a Certificate after the first day of August, 1815, shall for every such offence forfeit and pay the sum of Twenty Pounds." The other section, the 26th, declares the mode in which the same is to be recovered, viz., "by Action or Suit at Law, in the name of the Master, Wardens, and Society of the Art and Mystery of Apothecaries of the City of London, in any of His Majesty's Courts of Record in England or Wales."

Mr. Serjeant Heath.—Are you quite sure, Sir, that this Court has jurisdiction in this matter—I am not quite satisfied on that head.

Mr. Griffiths.—I think there is no doubt this Court has jurisdiction. There was a case lately decided, that these Courts had jurisdiction in an action of debt under the statute, and in this case, as this is a court of record, this action can be brought with respect to the practising as an Apothecary. I will first quote two or three cases, which, when your honour has heard, I think every doubt on your mind, as to the practising, will be removed. The first case is the Apothecaries' Society *v.* Lotinga, which your honour will find in 2d Moody and Robinson, p. 499, in which Mr. Justice Cresswell, in giving judgment, states this definition of the nature of the practice of an Apothecary. That learned judge says, "Now I apprehend that an Apothecary, is a person who professes to judge of internal disease by its symptoms, and applies himself to cure that disease by medicines." In Woodward *v.* Ball, Mr. Justice Williams says, "The practising as an Apothecary is the mixing up and preparing of medicines prescribed by the party himself." This case is found in C. Carrington and Payne, p. 578. That, you see, is a little more extensive definition of the duties of an Apothecary ; it may be, indeed, that a Chemist who mixes up the prescription of a Physician is liable to the penalty under this Act.

Mr. Serjeant Heath.—That has never been tried.

Mr. Griffiths.—Though it has never been put in force, I doubt not that we shall soon have the matter brought before the Courts, and the sooner

the matter is brought before them the better, and put in a proper situation, both for the profession and the public, who, as well as the profession, are deeply interested in it, inasmuch as no question perhaps more directly affects the public welfare than that proper seeurities should be afforded them in the employment of medical men. In the case of the Apothecaries' Company against Allen, reported in the 4th Barnwell and Adolphus, page 626, Lord Denman, in a case where a person kept no shop, and did not make up any Physician's prescriptions, and was not able to do so, but advised patients, and made up for and sold to them the medicines which he himself ordered; his lordship was of opinion, "That a person compounding medicines, and selling them under these circumstances, did act as an Apothecary in the ordinary sense of the word, and that it made no difference if he prescribed as well as prepared the medicine." This was confirmed by the full Court, and may, therefore, be taken as settled law. I am further instructed that this defendant has been in the habit of advising patients from time to time, and administering medicines to them. In this particular case I shall show your honour, by evidence, that he did attend Alexander Reeves, and that he gave to the Registrar of the district a certificate that the deceased died from pneumonia, which I shall also satisfy your honour is an Apotheeary's case. The patient appears only to have lived three days, which, perhaps, may lead to an inference that not only was there want of legal qualification, but great want of medical skill. On the certificate there is a printed notice to the parties signing it, containing these words, "If this form should fall into the hands of any unqualified practitioner, he is recommended not to fill it up."

Serjeant Heath—Does the Act state that none but Apotheearies shall sign such a certificate?

Mr. Griffiths.—No, Sir, but I believe that the practice is, that no Registrar will knowingly receive a certificate from any but a duly qualified practitioner; and, as the Registration Act was not passed at the time of the Apotheearies' Act, no provision could of course be made therein to that effeet. There being some doubt entertained in this case as to the qualification of the defendant, a letter was written to him by the Registrar, desiring to know by what authority he took upon himself to sign such certificates. To this he wrote in reply, alleging he had obtained a diploma as a Doetor of Medicine and Surgery of the University of Giessen. He therefore has nothing but the certificate of a foreign University, which cannot be made available in England; indeed, there are decided cases to show that Scotch Diplomas or Certificates are not legal qualifications under this Act; and I apprehend, therefore, that this defence, if set up by the defendant, cannot prevail. I am indeed rather taken by surprise by the defendant making any defence to-day, as I was instructed that he admitted the charge, and had thrown himself on the leniency of the plaintiffs.

The learned Judge read from a paper, which had been handed in by the defendant, a statement by him that he had made the admission alluded to upon the representation of Mr. Eyre, the solicitor for the plaintiffs, that if he did so, further proceedings should not be taken; but, having found that the Apothecaries' Company would not abandon their proceedings, he had thought proper to withdraw that admission, and endeavour to defend himself.

The Judge said he was willing to accede to anything the parties desired, if it would meet the justice of the case.

Mr. Griffiths.—This, Sir, is a public body, and your Honour will at onee perceive that they could not, consistently with their public duty, enter into any private compromise with any individual; but I am instructed to say, that the plaintiffs have really no wish to press the case with any

degree of harshness against Mr. Lobo, and are willing, therefore, to take their judgment for the penalty and costs, but the costs (out-of-pocket only) being paid, no execution will be issued, if the defendant promises not again to practise as an Apothecary while he remains unqualified, and *bonâ fide* abstains from so doing. The defendant having assented,

Mr. Serjeant Heath said,—I think the Apothecaries' Company have acted very rightly in bringing this case before the public, and very rightly also in refusing to enter into any compromise.

Judgment.—Let an order be made for the full amount of £20, and costs to be taxed; on payment of taxed costs, all further proceedings to be stayed until the further order of the Court. No further order will be made, unless it is shewn to the Court that the defendant has broken his promise, in which case the judgment will be enforced.

MEETING OF THE MEDICAL PROFESSION

TO CROW OVER MR. LOBO.

A MEETING was held at the Freemasons' Tavern, on Monday, the 26th ult., in consequence of the following requisition, signed by twenty-four Medical Practitioners, and addressed to the Secretary of the Medical Protection Society:

"Sir,—In consequence of the importance of the recent decision given in the County Court of Middlesex, in the case of the APOTHECARIES' SOCIETY *versus* LOBO, we, the undersigned, think it advisable that you should call a Public Meeting of the Medical Profession, for the purpose of taking into consideration the best means of seconding the efforts of the Medical Protection Office for the suppression of illegal practice."

"In accordance with the above requisition, I hereby convene a Meeting of the Medical Profession, at the Freemasons' Tavern, on Monday next, the 26th instant, at half-past Six for Seven o'clock, P. M.

"PRIDEAUX SELBY, *Secretary.*"

The chair was taken by John Propert, Esq., and we are informed that about 200 persons were present. Some of the speakers were loud and deep in their complaints against Chemists and Druggists for "taking the bread out of their mouths" by indulging in "counter-practice;" and the language in which this alleged encroachment was described, was not of the most temperate description. We have not been able to obtain, in time for the present number, an official or detailed report of the proceedings—nor, indeed, is this necessary. It is sufficient for our brethren to be aware of the general object of the crusade, of which the above is only a commencement. It must be recollected that this movement is in connection with the party from whom emanates the extraordinary proposal for the suppression of Dispensing Chemists, quoted in another part of this number (p. 456), and although we are not informed of any specific resolution of the meeting, describing the dispensing of prescriptions by Chemists as illegal, yet we must be prepared for any proposition, however monstrous, after the specimen already given.

We shall watch attentively all the proceedings, and give early information to our Members, either in our next number or by circular, if the urgency of the case should demand.

We wish it to be distinctly understood that we hold the olive-branch

in one hand and the thistle in the other, being particularly desirous to promote an amicable, fair, and honourable adjustment of the differences between the two parties; but whenever an intemperate, one-sided, or unjust attack is made upon Chemists and Druggists, we adopt the thistle in SELF-DEFENCE with the appropriate motto—

"Nemo me impune lacessit."

DEATH FROM OXALIC ACID.

ON Friday evening, March 23, Mr. Mills held an inquest at the King's Head, New Road, on the late Rev. William Shore Chalk, Rector of Weldon, Bedfordshire, who died from taking oxalic acid, under the following extraordinary circumstances:—George House, clerk to the Euston Hotel, deposed, that on Wednesday evening last, about four o'clock, on forcing open the door of his bed-room, he was found lying dead in bed, and at his side the basin full of matter he had ejected from his stomach. On the dressing-table were a glass tumbler, a penknife, and a paper labelled *Purified Epsom Salts*. In his pockets were found letters, his address, and £4. 8*s*. in money. The Rev. William Monkhouse, Vicar of Goldington, Bedfordshire, knew deceased for twelve years, and never knew a man of more composed or even temper. He had every thing that could make life desirable, and was the last man that would contemplate suicide. In his opinion the Druggist supplied deceased with oxalic acid instead of salts. He was in the habit of taking salts. Mr. Shelding, Surgeon, 11, Euston-square, said he was called to attend deceased, whom he found dead. The contents of the basin at deceased's bedside were impregnated with oxalic acid. No clue could be had to the name of the Druggist who supplied the oxalic acid. His opinion was that it was given by the Druggist in a mistake, and that the deceased took it unintentionally under the impression that it was Epsom salts. Mr. Lynn Smart, solicitor, 51, Lincoln's Inn-fields, gave evidence to the same effect.—Verdict—"Deceased was killed by oxalic acid; but whether he took it designedly to destroy life, or through ignorance of its effects, there was no evidence to prove."

THE PREVENTION OF ACCIDENTS BY POISONING.

BY MR. THOMAS HARVEY.

(*Communicated by Mr. Deane*).

I TAKE the liberty of suggesting, that a means of preventing the accidental substitution of dangerous medicines in dispensing, more simple, and perhaps more effectual than any that has yet been proposed, would be to *cap* the bottles, containing such articles as strychnia, veratria, morphia, and its salts, pulv. opii, &c. &c., with vulcanized India-rubber caps; or if these were not at hand to tie over the bottles with tin-foil, plain or coloured, or with bronze paper, or even leather.

The Macintosh elastic cap would possess great advantage both in appearance and in the facility with which it might be removed and replaced. I need scarcely point out that this plan offers the least possible impediment to quickness and convenience in dispensing, while it offers a security almost complete against the use of one of these articles *in mistake* for any other not included in the list of virulent poisons.

Leeds, Jan. 19, 1849.

(NOTE BY MR. DEANE.)

In addition to the above, I may mention my practice with certain arti-

cles, and I think you will at once see the value of the proposed method, which, however, is not new, as you had a letter on the subject some time ago. There are few shops where nearly every imaginable want in the medical department may be obtained on application, but there are a great many where a few stray out-of-the-way things are always to be met with in variable quantities ; some may keep an ounce or two, or perhaps more, of both veratrine and jalapine, and those articles probably in well-labelled bottles, but others of our brethren may only keep a drachm or two, and those in half-ounce or one ounce bottles, corked, and with a written label. Now, as both of these substances are really very similar in appearance, any one in a moment of abstraction may take the one for the other, and the result might be most disastrous. The same may be said of the two prussic acids, Scheele's and the P.L., both may be kept with distinctive labels, and perhaps as an additional precaution, in different kinds or sized bottles, yet this may not be sufficient in shops where the articles are not frequently required for dispensing. Most of these small articles, if I may so term them, are kept aloof from the general visible shop stock, on account of the unsightly aspect they would present to the customers ; and so being generally out of sight, and partially out of mind, require a greater effort to recognise their identity, than those who are in the daily, and perhaps hourly, habit of dispensing them, may suppose. Therefore, for a long time past, to prevent the possibility of accident from such causes, I have kept sundry dangerous articles not *very* frequently in use, but which are more conveniently kept on the same shelf with others having a similar appearance, tied over with a piece of leather. Thus the two prussic acids are together, Scheele's is tied over, not being frequently required, while the other is left free for the opposite reason. Veratrine and jalapine are near each other, the veratrine is tied over. Of larger articles, pulv. lyttæ and pulv. cubebæ, are on the same shelf, and the action of light has brought the bottles to present a similar aspect. The former is always tied over, and not being in frequent use, is not attended by any inconvenience. Arsenic is always tied over, wherever kept, for being a white powder it might be misplaced, and if not tied over lead to dangerous accidents.

The practice is applicable to a variety of articles, varying with the circumstances and requirements of the Druggists in different parts of the country. I think, therefore, a few words from you on the value of the recommendation would have great weight, and benefit both the Druggist and the community.

Clapham Common, Feb. 19, 1849.

Another correspondent, Mr. Mills, of Bourne, in allusion to this subject, recommends the use of labels for poisonous substances with the word *poison* in red ink ; and also suggests the plan proposed above, of tying over the bottle with tin-foil or leather.

NOVEL METHOD OF DISPOSING OF A DOCTOR'S SHOP.

When Solomon promulgated the doctrine that "there is nothing new under the sun," this had reference to the age in which he lived. It certainly is not applicable to modern times, when every year or even every month brings forth some novelty in art or science. The following advertisements are examples of originality, resulting from the fact that Doctor's shops have become "a drug in the market :—"

TO SURGEONS, Chemists and Druggists, and Medical Students, *A chance seldom to be met with for only* £1. A business in the above line.

with a very neat and compactly fitted shop, which has been established some years, in a very respectable and rapidly improving neighbourhood, will be disposed of in the following manner ; namely, 100 SUBSCRIBERS AT £1 EACH. The prize to be THE BUSINESS, SHOP FIXTURES, &c., and one member in every ten to have his money returned.

MEDICAL.—To CHEMISTS, SURGEONS, MEDICAL STUDENTS, &c. A Retail Shop, COMPLETE and well STOCKED, situated in one of the largest thoroughfares in London, having Two commanding Plate Glass Windows, with a large lamp outside, to be RAFFLED FOR, at £1 1*s*. a member. One hundred members required. The shop has been established three years, and cost £150 fitting up. The present owner wishes to dispose of it, owing to his retiring into private practice.

It is not necessary to quote the references. In regard to one of them, we have been informed on good authority that a porter in one of the metropolitan hospitals was active in disposing of tickets. In the absence of some such evidence of authenticity, it might almost be supposed that the advertisements were fictitious, but this is not the case. We have not heard the result of the drawing.

REVIEWS.

ERUPTIONS OF THE FACE, HEAD, AND HANDS, *with the latest Improvements in the Treatment of Diseases of the Skin.* Illustrated with coloured Plates. By T. H. BURGESS, M.D., &c. &c. London: Henry Renshaw. 8vo, pp. 254.

This work is favourably noticed in the *Medical Gazette*, where the subject is more appropriate than it would be in this Journal. There is one portion of it which is likely to interest our readers, namely, "Selections from the most useful forms of prescriptions for diseases of the skin." These comprise a great variety of remedies, some of which are not in general use, and to each of them is appended the form of disease to which it is applicable.

Among these remedies are phosphorus pills as follows:—℞ "Phosphorus g. iij to ℈j ; oil of cloves ♏x to ʒj. Mucilage *q. s.* Make twelve pills. One twice a day in lupus, syphilitic tubercle, and inveterate scaly diseases." We may observe that some solid vehicle is necessary to form the mass—flour or bread-crumb will answer the purpose. Care should be taken in mixing the mass, otherwise it ignites in the mortar. Patients should also be cautioned to keep the pills in a safe place.

The term "Acidulated Lemonade" is erroneously applied to acid drinks composed of sulphuric acid and decoction of barley and syrup ; or nitric acid, infusion of saponaria, and syrup.

Among the tonics, there is a bitter infusion, one of the ingredients of which is "bitter herbs, ʒij." This is a very indefinite formula. Many of the formulæ are of a potent nature, abounding in arsenic, mercurial preparations, iodine, &c., but do not appear to suggest any further observations.

HEALTHY SKIN: *a Treatise on the Management of the Skin and Hair in relation to Health.* By ERASMUS WILSON, F.R.S. Third Edition. London: John Churchill. Small 8vo, pp. 238.

This is rather a prophylactic than a medical work. The author describes minutely the nature, structure, and functions of the skin,

hair and nails, in a state of health, and gives some valuable suggestions for the prevention of disease. Among the means recommended, the use of baths and general cleanliness may be mentioned as very important. The eruptions of the skin, their nature and varieties, are briefly described, and useful hints are given respecting warts and corns. To those who desire sound practical information on these subjects at a small cost, we can recommend this little book, which has already established its character by arriving at a third edition.

Medical Reform, a Public Question; *or, How to Save Twenty Thousand Lives per Annum without putting the Country to a Farthing's Expense.* By A Physician. London: J. Hatchard and Son. 8vo, pp. 35.

This pamphlet contains some hints for the Medical Protection Society.

The Flowers of the Aln. By John Lamb Luckley, Secretary to the Alnwick Botanical Society. Alnwick: printed and published by J. L. Luckley, Bailiffgate. 8vo. pp. 28.

The Dependence of Animal Motion on the Law of Gravity. By Henry Wiglesworth, M. B., &c. Part 1, 8vo, pp. 156. London: H. Bailliere; — Swansea: Herbert Jones.

Elements of Chemistry, Theoretical and Practical. By Sir Robert Kane, M.D., M.R.I.A. (Second Edition.) Dublin: Hodges and Smith.

To be noticed next month.

TO CORRESPONDENTS.

Mr. Maggs (of Kelvedon) has forwarded the following formula for Volatile Essence for Smelling Bottles :—℞ Ammoniated alcohol, ℥xvi; English oil of lavender, essence of bergamot and lemon, of each ℈iv; oil of cloves, ℈ij; camphor, ℥v ℈j. Macerate a week and strain. We subjoin another formula:—Essence of ambergris and musk, ℥iv; otto of roses, 20 drops; oil of lavender, ℥j; ammoniated alcohol, ℥x. Mix, then add of the strongest liquor ammoniæ, ℥x.

L. S. D. (Newcastle.)—Full instructions for preparing collodion will be found in vol. viii., No. 4, page 169.

An Associate (Bishopsgate Street).—(1.) We cannot recommend the process of passing chlorine through cod liver oil with a view of depriving it of smell.—(2.) A Member of the Pharmaceutical Society may become a Life Member by the payment of twenty guineas.—(3.) When iron filings have become oxidized, they are not fit for sale as iron filings.—(4.) Several oils are used for adulterating olive-oil. Such substitution for medicinal purposes is quite unjustifiable.—(5.) Formulæ for black draught are various. We cannot give one on any recognized authority.—(6.) Visitors may obtain admission casually to the lectures.

A. I. T. will observe that the subject to which he alludes is not overlooked.

Mr. Jenning (Halifax) directs attention to the oppressive nature of the Medicine Stamp Act, and the injury it inflicts on the public by prohibiting Chemists from giving important, and, in some cases, needful information respecting medicines, unless stamped. [We quite agree in this opinion, and hope the time is not far distant when that class of laws will be reformed or repealed. Excise laws are always obnoxious and oppressive.]

An Old Subscriber.—Grease is obtained from bones by boiling them in water and skimming off the fat. Annatto is used for giving an amber colour to grease, and a green colour may be given by heating the fat with green leaves, from which it will extract the chlorophylle.

Quæsitor.—(1.) According to the Pharmacopœia, an ounce of vinegar should not yield more than 1.14 grains of sulphate of baryta when treated with a soluble salt of baryta.—(2.) The examination is on General and Medical Botany.—(3.) Registered Apprentices who have obtained Certificates for classical proficiency, are again examined with reference to their knowledge of Latin prescriptions in passing the Minor Examination.

Juvenis wishes to be informed of the best method of taking impressions of leaves. He does not state for what purpose, or in what material. If he alludes to the electrotype process, Mr. Mackinley's paper in vol. iv, page 354, gives the requisite instructions.

T. G. M. wishes for a good formula for *Blue Writing Fluid*, which becomes black on drying.

A Chemist (Halstead).—Chloroform is called Perchloride of Formyle by some Chemists.

Amator Scientiæ.—We have never seen the preparation alluded to, and cannot recommend it.

Corkagiensis.—There are some interesting points in the essay, and for a beginner it is by no means discreditable; but we do not consider it quite suitable for publication in this Journal, especially as the author's name is not appended.

A Member (Wandsworth).—Spirit of chloric ether can only be understood as another name for chloric ether. If administered in a mixture, unless suspended in the form of emulsion, the chloroform separates and falls to the bottom.

R. H. A.—(1.) The stamp for nostrums, price 1*s.* or under, is three halfpence.—(2.) Wanted a good formula for tincture of myrrh and borax.

Alpha.—The label enclosed does not subject the article to stamp-duty, according to the notification published in our Number for October last.

A Country Chemist.—See the above Number. The three labels enclosed are liable; but the law is not enforced in regard to one of the articles, pomatum, when sold as an article of perfumery for strengthening the hair.

J. C. (Maidstone) states that an effort has been made to introduce early closing in Maidstone, and all except six have consented.

ERRATA.

February Number.—Page 383, line 31 from top, *for* "comminated," *read* "comminuted." Same page, line 34, *for* "lamina," *read* "laminæ."

March Number.—Mr. G. H. Smeeton, in the List of registered Apprentices, is stated to be residing with "Mr. Morris of Birmingham," *instead of* "Mr. Morris Banks."

Advertisements to Mr. Churchill, Princes Street, Soho.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. Smith, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the Editor, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. XI.—MAY 1st, 1849.

THE PUERILE PROCEEDINGS OF THE MEDICAL BREAD AND CHEESE SOCIETY.

In our last number we announced the existence of this new body of crusaders, with the object of their crusade, namely, first, against patients for the recovery of debts; and, secondly, against Chemists for "the breaking up of their establishments." For both purposes the means relied on are the County Courts—the object to be attained, is the bread and cheese.

Judging from the long list of patients from whom cash has been obtained, as published in the *Medical Protection Circular*, we may infer that this branch of their operations has been eminently successful, and that the Members of the Association are likely soon to acquire no small share of notoriety, if not popularity, with the public.

As a preliminary step to the attack upon rival dispensers of medicine, these self-constituted champions of Rhubarb Hall tried their strength upon a defenceless foreigner, who, being inexperienced in English law, and unacquainted with the means of resistance, offered no opposition, and became an easy prey.

Elated with success, the victors assembled to congratulate each other, passed a resolution expressive of "infinite satisfaction," and concerted measures for proceeding with the important project of breaking up the establishments of Chemists.

For this purpose they selected Mr. Wells, a young man recently established in business in a small shop in High Street, Camden Town, and one who, from his age and position, and not being a Member of the Pharmaceutical Society*, was considered a suitable victim. Mr. Collins, whose shop is a few doors from that of Mr. Wells, was a valuable auxiliary, and to his exertions in getting up the case, obtaining the defendant's bills as evidence, and other disinterested (?) services, the plaintiffs are much indebted, unless indeed the obligation is on the other side.

When we published last month an extract from the *Medical Protection Circular*, enunciating the doctrine that Chemists cannot legally dispense prescriptions, we scarcely supposed that the

* Mr. Wells not being a Member of the Pharmaceutical Society, the Council could not interfere on his behalf; but he is indebted to Messrs. Garden and Howse, who voluntarily came forward as witnesses to establish the rights and privileges enjoyed by Chemists before 1815.

new society would venture to try this question in a court of law: but it is an old saying that

"Fools rush in where wise men fear to tread,"

and, however monstrous it may appear, it is a fact that the plaintiffs in this case hazarded the experiment.

Having retained a young barrister, who was not unwilling to exhibit his new wig in a County Court, they placed within his reach the opportunity of acquiring (in the event of a successful issue) a reputation which, we have no hesitation in saying, would have raised him to eminence in his profession.

Much credit is due to that gentleman for the skill and ingenuity with which he propped up a cause which had not a leg to stand upon, giving fallacies the semblance of fact, using *non sequiturs* to fill up gaps in his argument, and bespattering the witnesses when unable to confute their testimony.

The policy of sending the witnesses out of Court was manifest, when it appeared that the only witness to prove the attendance of Mr. Wells was Mrs. Harris, while there were three witnesses who proved that Mr. Godwin was the medical attendant. The only method of meeting this difficulty was to cross-question the three witnesses separately, for the purpose of eliciting some contradiction in their testimony, on the principle adopted in the well-known case of Susanna and the Elders. Then, by way of justifying the proceedings, the defendant was represented as a person of low origin, without any education whatever; whereas he was regularly apprenticed, and was so far qualified that he acted as assistant to Mr. Collins for three or four years before commencing business on his own account; while Mr. Collins, an active promoter and a witness for the prosecution, admitted, on cross-examination, that his brother was a visiting Surgeon, keeping a surgery or shop, and that he dispensed his brother's prescriptions, which, according to the doctrine of the plaintiffs, was illegal; neither he nor his brother being Apothecaries! Again, the inference drawn from the evidence of Mr. Knaggs was no less ingenious than unjust, since the Act of 1815 expressly reserves to persons in practice as Apothecaries prior to that date, the full legal right, by virtue of which the indentures of Mr. Knaggs were as valid as those of any other Apothecary. † Another *non sequitur* is worthy of notice, namely, that *because* it is the duty of the Apothecary to prepare faithfully the prescriptions of Physicians, &c., *because* an Apothecary refusing to prepare such prescriptions faithfully is liable to a penalty, THEREFORE it is obvious that any person, not being an

† One of the leading Members of the "Medical Protection Society" is in a similar predicament, not being a Licentiate of the Hall, but practising as an Apothecary by virtue of his right as a practitioner before 1815.

Apothecary, who presumes to prepare prescriptions, is liable to penalties under the Act ! ! Further examples are needless ; but it is due to Mr. Corrie to state, that our condensed report gives a very inadequate idea of the masterly style in which he refuted the sophistry of his opponent.

In conclusion, we have only to express our surprise and regret, that a body so respectable as the Society of Apothecaries, should submit to the degradation of allowing the name of the Master and Wardens to be mixed up with a transaction of this nature; the Medical Protection Society acting in the capacity of CAT'S PAW, the Master and Wardens officiating as MONKEY, and the bread and cheese of the Chemists representing the CHESTNUTS.

PHARMACEUTICAL EDUCATION.

YOUNG men, at that period of their lives when the opportunity of improvement is within their reach, are too often insensible of the value of knowledge. They forget the well-established fact that "knowledge is power," and when it is too late they discover their weakness. In after-life the cares and engagements of business distract their minds, and they have no time to make amends for past negligence ; but, looking back to the period of their youth, they lament their deficiency, and wish that they had been more industrious.

The world is in a state of progressive improvement. General at well as special education has engaged the attention of politicians, of philanthropists, and of philosophers. All classes of the community are comprised in the grand scheme of intellectual cultivation, and, from the ragged schools upwards, the rising generation are provided with opportunities for improvement which their ancestors did not enjoy.

Among the middle classes education is not confined to languages, geography, and arithmetic : the rudiments of science and natural philosophy are more or less cultivated. The Chemist is no longer the sole depository of chemical knowledge ; but Philosophical Societies and Mechanics' Institutes are spreading the elements of his science among persons of all ranks and vocations.

The Chemist must keep pace with the times, or he may find to his mortification, that his customers are as well informed as himself in his own department. Although the law does not regulate his qualification, the public will find him out if he is deficient. The responsibility of acquiring the requisite knowledge rests upon each individual, and those who distinguish themselves will find that their merit is appreciated.

To aid in this important work, schools are founded, lectures are delivered, books are published, and every argument is brought into

the field to induce young men to take advantage of these privileges. Many who reside where there is no school lament the difficulties under which they labour in acquiring information. Others more favourably situated neglect the chance. Some young men complain that their employers will not allow them to attend lectures, others, who are urged to attend, decline to take the trouble.

At the establishment of the Pharmaceutical Society in Bloomsbury Square, the course of instruction is complete, comprising every facility for qualifying the Pharmaceutical Chemist. The Professors are distinguished authorities in their respective departments, and indefatigable in the discharge of their duties. No trouble or expense has been spared in providing with every requisite the laboratory, the library, and the museum.

Comparing the number of assistants and apprentices who reside within a mile of the school with the number who attend the lectures, the disproportion is by no means creditable to the rising generation. We should be sorry to see the figures in print. Leaving therefore this statistical question to the reflections of those whom it may concern, we take this opportunity of adverting to the

SUMMER COURSES OF LECTURES ON BOTANY AND CHEMISTRY,

which commence with the month of May. We deeply regret the severe indisposition of Dr. A. T. Thomson, who has from the establishment of the School held the appointment of Botanical Professor, and whose course of lectures was announced as usual in our last number. A severe attack of bronchitis has incapacitated him from exertion, and for a time deprived the Society of his valuable services. In this emergency, an arrangement has been made with one of his former pupils, Mr. Bentley, who has for the last year officiated as Botanical Professor at the London Hospital, and who will deliver the Botanical Course of the Pharmaceutical Society during the ensuing summer. We sincerely hope that Dr. Thomson may be sufficiently restored to health to be able to assist at the demonstrations at the Botanical Gardens in the Regent's Park towards the latter end of the course.

The lectures on Chemistry, by Professor Redwood, will continue through the summer months as usual—Organic Chemistry commencing in the early part of May.

PATENT INVENTIONS AND TESTIMONIALS.

The custom of consulting practical men respecting inventions of a scientific nature, has this two-fold object: by means of the opinions so furnished, the inventor is fortified with some data on which to make his calculations as to the prospect of success; and, in proportion to the encouragement thus afforded, he is enabled to operate on the confidence or credulity of the public.

Such opinions are generally given in the form of a certificate, purporting to be written for the information of the patentee, but practically obtained as a means of launching the new invention into the haven of public favour, on the tide of scientific authority.

Much responsibility therefore rests on those who furnish these documents, and in many cases considerable tact is requisite in avoiding the two evils, of offending the vendor or deluding the purchaser of the patented article. An unfavourable certificate, or one which "damns with faint praise," would be of no value to the proprietors of a new patent, while an over-dose of praise leads to fallacious expectations and consequent disappointment; a result calculated to injure the reputation of the author of such certificate as an authority. It is also possible to convey an erroneous impression, by an unguarded or imperfect statement of facts, or by the omission of some qualifying circumstances which are required to render the report complete.

We are induced to advert to this subject in consequence of the recent fatal occurrence at Loudown Road, St. John's Wood, arising from the imprudent use of one of Carman's stoves. It was stated in evidence at the inquest, that the said stove was recommended by several testimonials, among which is one by Mr. Galloway, and that so extensive has been the sale, that 1100 stoves have been disposed of during two years. The vendors declare that the stove is perfectly safe, and Mr. Carman, jun., in a letter to the *Times*, of April 14, endeavours to explain away the accident so as to exculpate the stove altogether. He observes, that a stove adapted to warm a room 36 feet square was quite unsuitable in a room of 14 feet 9 by 9 feet 8 and 7 feet high, and the respiration of four persons in this room would of course increase the evil. He compares this abuse of his stove to the removal of a railway-train from its legitimate locality to Fleet Street, where death and destruction would result, not from any defect in the engine, but from the imprudence of those who removed it out of its proper sphere. Thus far the explanation is rational; but Mr. Carman proceeds,—

"In conclusion I have to add, that the prepared fuel sold by me is open to the inspection of the public, and can be clearly demonstrated to contain none of the deleterious qualities of common charcoal; but, if the latter article is substituted by mistake, or from motives of convenience or economy, in any case, I surely cannot be held responsible for its defects."

Now the deleterious product, from which danger is chiefly to be apprehended, is carbonic acid resulting from the combustion of CARBON. It might, therefore, be inferred, from Mr. Carman's statement, that this is removed; but he does not inform us what constituent of the charcoal remains as a supporter of combustion!!!

The method of preparation to which charcoal is subjected to con-

vert it into prepared fuel, is immersion in a solution of carbonate of soda. This favours the continuance of combustion by preventing the formation of the light ash, which otherwise, at a slow fire, is apt to shield the carbon from the air.

The discussion which has arisen on this subject carries our memory back to the year 1837, when the announcement was made public that a process had been discovered for preparing charcoal so that it might be used as fuel, with perfect safety and great economy, in a stove of simple construction;* that these stoves required no chimney, emitted no noxious gas, and might be placed on a table or in any part of a room. Of course this statement was received with doubt by scientific men, and the patentee submitted his invention to the test of scientific authority for investigation. A series of careful experiments were made, which are detailed by Mr. Cooper, one of the Chemists to whom the matter was referred, who describes in his report the condition of the atmosphere before and after the stove had been in use for a certain period, in a small room, with little or no ventilation, and compares the amount of carbonic acid thus formed with the quantity generated by sperm-oil, tallow and wax-candles, gas, &c., as also by respiration in crowded assemblies. These experiments show a certain amount of deterioration in the atmosphere from all the above causes, but do not point out any striking fact either for or against the safety of Joyce's stove. The report concludes as follows:—

"The advantage which I conceive Joyce's stove to possess over the ordinary methods of burning charcoal for warming apartments, is its perfect control over the rate of combustion of the fuel; for while, in a common chaffing-dish, or brazier, almost an unlimited quantity of charcoal may be consumed in a comparatively short space of time, and liberate very suddenly a large volume of carbonic acid, which might be prejudicial to health if not absolutely dangerous, in these stoves, by their peculiar construction and arrangement of proper-sized apertures, the fuel can be consumed only at a certain given rate; and if they are properly adjusted to the size of the apartment they are intended to heat, my experience leads me to believe that no injurious consequences can arise from their employment. (Signed) "John Thomas Cooper.

"82, *Blackfriars Road, London, 14th June*, 1838."

Professor Brande also gave a certificate as follows:—

"Having been present at the experiments made at Mr. Cooper's house, with a view of determining the degree of deterioration which the air suffers by the employment of Joyce's stoves in close rooms, and having examined, in conjunction with him, the compositions of the atmosphere under such circumstances, I can certify that, after burning for twelve hours in a close room of the dimensions above stated (viz., 14 feet by 13 feet and 12 feet high), that less than one per cent. of carbonic acid was in all cases found in the air of the room—that such proportions of carbonic acid cannot be considered as deleterious or in the least degree dangerous in reference to respiration—that it falls short of the relative quantity of carbonic acid found in crowded and illuminated rooms, or in buildings in which many persons are congregated, such as churches, theatres, and assembly-rooms, in which ventilation is generally imperfect, and in which, as far as my experience goes, the relative proportion of carbonic acid always considerably exceeds one per cent. I am, therefore,

* Joyce's stove.

of opinion that the said stoves, which are so constructed as to consume only a limited quantity of pure charcoal in a given time, may be employed with perfect security for all the purposes for which they have been proposed; and I consider the grounds of this opinion sufficiently detailed by the experiments above given. (Signed)

"WILLIAM THOMAS BRANDE.

"*London*, 14*th June*, 1838."

Gay Lussac examined the nature of Joyce's stove and the prepared fuel, from which investigation he drew the following conclusions :—

"First, that the fuel is only a light wood charcoal well prepared, containing more alkali than what is naturally found therein ; secondly, that this fuel yields no more caloric than any other sort of charcoal ; thirdly, that the mode of heating employed, which is to dispense all the produce of its combustion into the apartment, really presents an economy on other modes, but it is only by vitiating the air and rendering it dangerous for respiration; fourthly, that a well-constructed stove, taking the atmospheric air out of the apartment, can yield nine-tenths of its heat produced without vitiating the air, nor cause any bad smell, or affect the respiration; and that the use of such a stove is less dangerous and almost as economical."

Another French Chemist, M. Pilay, gives a different opinion. He states that common charcoal differs essentially from the prepared fuel ; the former containing organic substances, the decomposition of which yields results even more deleterious than carbonic acid. Having detailed a series of experiments, he observes,

"From these experiments I am convinced that the proposed mode of heating, if slightly improved, may be used without the least inconvenience. It is with this view that I now offer to prepare the charcoal, and an apparatus which will make this mode of heating very useful."

Mr. John Marshall, who differs from Gay Lussac in his opinion of the stoves, states that " the quality of the fuel departs in no respect from the nature of charcoal ;" that " the products of the combustion are spread in the apartment without vitiating the air," and without impediment to respiration; and that the stove " does not want a chimney, as it gives out neither smoke, dust, nor smell into the room."

Amidst this conflicting testimony stubborn facts furnish the casting vote, proving that while with judicious management the stoves may be used with safety, yet in the hands of inexperienced persons they do occasionally produce death, and as the public at large are not universally educated as Chemists and philosophers, the testimonials in favour of these stoves should be so qualified and explained as to give a distinct idea of the danger, and the means of avoiding it.

In the absence of such explanation, it is not surprising that when accidents occur, the accuracy of the certificates is called in question, which tends to lower the estimation in which Chemical authority is held by the public.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

LIST OF MEMBERS, ASSOCIATES AND APPRENTICES,
Elected in March and April.

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	*Stone, Thomas W. .	235, Oxford Street
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Tenby . . .	Sloper, Frederick E.	High Street

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Hill, Thomas . . . . . Leatherhead

MINOR EXAMINATIONS.

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Kirby, Samuel Amos	Gosport
Miller, Thomas Lanfear . . . , . .	Blandford
Quiller, Charles Rowett	Helstone
Ringrose, Blanshard	Leeds
Willmott, Edwin	Southwark

REGISTERED APPRENTICES.

APPRENTICES.	RESIDING WITH	TOWNS.
Denne, John L.	Mr. Buss	Faversham
Lingwood, James G. . .	Mr. Mabson . . .	Yarmouth
Smeeton, William . . .	Mr. Baldwin . . .	Iron Bridge
Todd, Joe	Mr. Harrison . .	Carlisle
Treen, George	Mr. Hollier . . .	Dudley

LECTURE
ON ELECTRICITY AS A SOURCE OF LIGHT.

BY THEOPHILUS REDWOOD, ESQ.

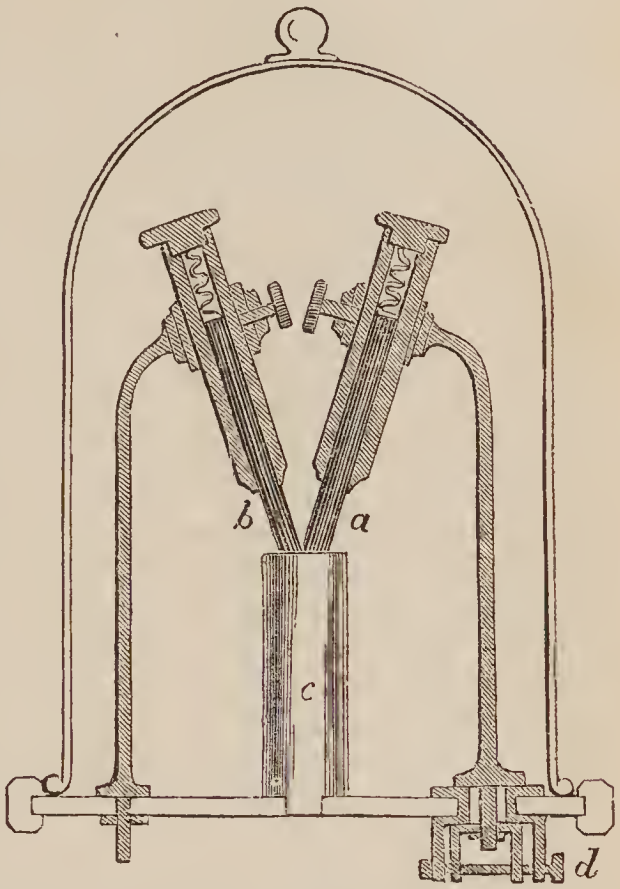
Professor of Chemistry and Pharmacy to the Pharmaceutical Society of Great Britain.

(*Continued from page 477.*)

In November, 1846, Mr. Staite took out a patent "for certain improvements in lighting," which consisted of a method or methods of maintaining an uniform distance between the charcoal points of an

electric light apparatus. Fig. 1 represents the most simple and efficient of the means described in the specification of this patent. The charcoal electrodes *a b*, are made to fit into two hollow brass cylinders, in which they slip up and down freely. The ends of the electrodes are supported on a solid cylinder *c*, of plaster of Paris, and they are kept constantly in contact with this by a spiral spring within each of the hollow cylinders, which presses the charcoal down as the lower ends are destroyed by the action of the electricity. There is an adjusting screw at *d*, by means of which the ends *a b*, may be made to touch each other so as to close the circuit, and then to recede to any required distance. The current being established by bringing the electrodes into contact, the latter are separated so as to produce the required light; and it appears to have been thought that the distance from each other at which the charcoal points are thus fixed, would remain unaltered. Such, indeed, would have been the case, if the action of the electric current had merely caused a wasting or dissipation of the charcoal; but there is always an accumulation of the disintegrated particles about the points, which would soon fill up the intervening space, and destroy the required effect. Had this arrangement proved efficient, its simplicity would have strongly recommended it for practical application. We are, however, justified in concluding that it has not proved efficient, from the fact, that very shortly after enrolling the specification, the patentee took out another patent for further improvements in the method of adjusting the charcoal points. The second patent was sealed in July, 1847, and specified in January, 1848. In this patent, a new principle was adopted for regulating the adjustment of the electrodes, which consisted in the use of an electro-magnet. "This part of the invention," it is stated, "is to impart *more surely* such motions to one of the electrodes of the apparatus that the light may be prevented from going out, be kept in a more uniform state, and be renewed by the action of the apparatus itself whenever it has been put out, providing always the electric current is maintained properly." A further improvement was again effected by the patentee, a few months afterwards, in the mechanical arrangement connected with the application of the magnetic power, and for this and some supposed improvements in the construction of batteries, a third patent was taken out in July, 1848.

Fig. 1.



There are three distinct kinds of apparatus, for producing light by electricity, described in this patent. These are—

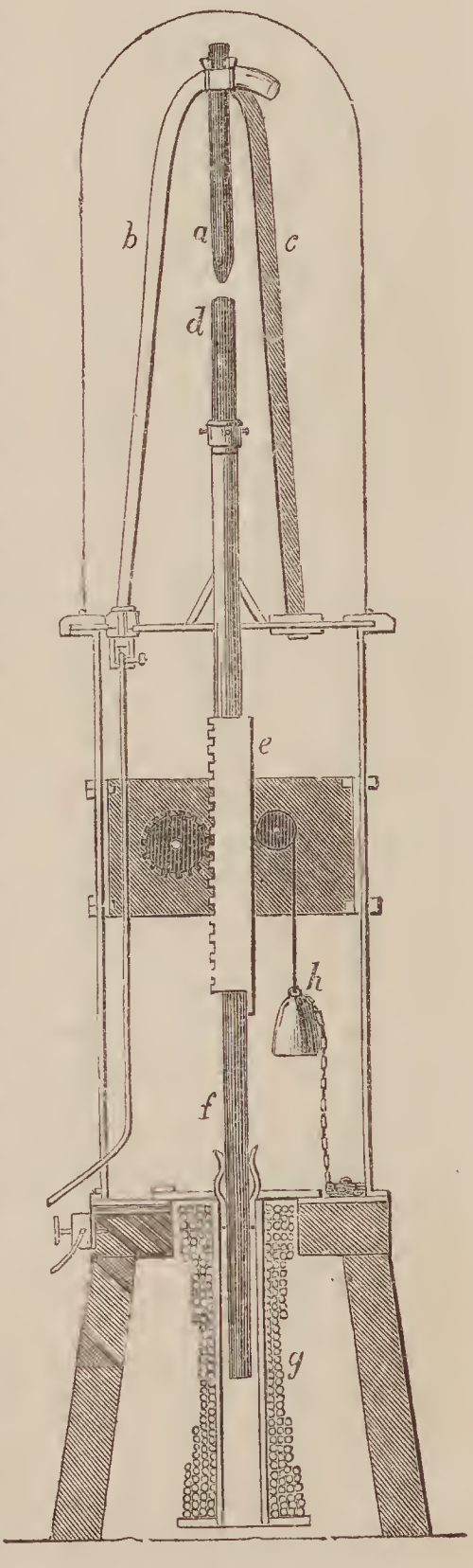
1st. The apparatus for producing a regularly intermittent light by electricity, between charcoal electrodes, which is especially suitable for lighthouses, and applicable for other purposes.

2dly. The apparatus for obtaining a constant and uniform light with charcoal electrodes.

3dly. An arrangement and apparatus for obtaining a constant and uniform light by the ignition of a metallic wire.

1. The apparatus for producing a regularly intermitting light is represented by fig. 2. This consists of a frame which contains the principal part of the apparatus, and above the frame are two charcoal electrodes (*a d*) which are covered by a glass shade. The positive electrode (*a*) is fixed in a metallic support (*b*), through which it is connected with the battery. The negative wire of the battery is coiled round a hollow cylinder, so as to form a helix (*g*), through the centre of which a bar of soft iron passes freely. The wire of the helix is brought into contact with the iron bar (*f*), and the latter is surmounted by a brass rod (*e*), carrying the negative electrode (*d*), and the lower part of which is cut with teeth, which work in a pinion fixed to the frame of the apparatus. A weight (*h*), is attached to the rod (*e*), by means of a string which passes over a pulley. This weight is intended to counterbalance the iron bar (*f*) together with the rod (*e*), and the charcoal electrode, and to keep the latter in contact with the upper electrode (*a*), when the apparatus is not in operation. There is a small chain extending from the weight (*h*), to the stand beneath, a portion of which rests on the stand, so as to equalize the effects of the weight when the electrode (*d*) is removed to some distance from (*a*).

Fig. 2.

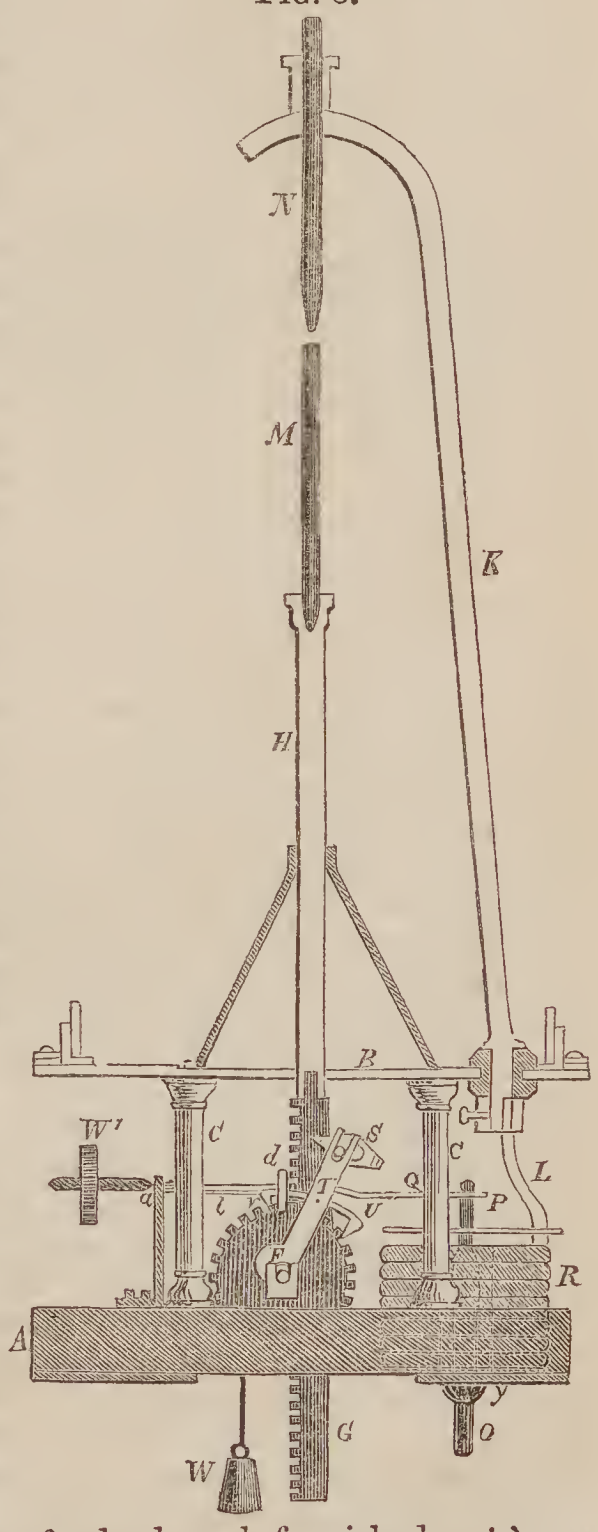


The action of the apparatus would be as follows:—The two wires being connected with a battery of sufficient power, and the circuit closed by bringing the electrodes (*a*) and (*d*) into contact, the iron bar (*f*) becomes converted into a magnet, and is then drawn down into the helix (*g*). The electrodes are thus separated from each other, so as to produce the greatest amount of light, but the distance between them continuing to increase as the magnet

is drawn further into the helix, the circuit is ultimately broken, the light extinguished, and the iron bar restored to its original condition. The weight now draws the bar and electrode up again, until the latter comes into contact with the upper electrode, thus re-establishing the current, and producing a recurrence of the previous effects. It is obvious that a succession of flashes of light at regular intervals would thus occur, and by some modification of the mechanism, the duration of the light and its intermission, might be easily regulated.

2. The apparatus for obtaining a constant and uniform light with charcoal electrodes, is more complicated than the preceding; but it is constructed upon a somewhat similar principle. Fig. 3 represents the essential parts of this apparatus. The electrodes (*M N*) are placed as in the previous apparatus. The toothed part of the rod (*G H*), to which the lower electrode is fixed, works into a pinion which turns on a spindle with fixed supports. A barrel (*F*) is attached to the pinion, and a weight (*W*) is suspended by a string which passes round and is fixed to the barrel, so as to counterpoise the weight of *G H M*. On the spindle of the pinion is fixed a wheel with square teeth. A lever (*T*) turns on the same spindle, and carries a double paul (*U V*), which works on a pin projecting from the side of *T*, so that the paul can lock into the teeth of the square-toothed wheel in either direction. A long horizontal lever (*Q*) passes over the paul from a joint or fulcrum (*a*), and this lever carries a light spring or tongue (*l*) close beneath it, the end of which is kept from springing away from the lever by resting in a step in a little stirrup or fork (*d*), which is attached to the lever (*Q*), and embraces the square-toothed wheel, and the end (*V*) of the paul. The paul and its lever (*T*) are kept in a state of slow vibration from side to side by means of a crank (*S*), which works in a fork at the end of *T*, the crank (*S*), being made to revolve by an ordinary train of wheel-work furnished with an escapement or fly-wheel, and driven by spring-power or weights.

Fig. 3.



When the lever (*Q*) is turned a little downwards, its tongue (*l*) presses the end (*V*) of the paul into the teeth of the wheel, and the vibratory motion of *T* causes *V* to drive the wheel round notch by notch. This motion of the wheel causes the pinion to elevate the rack (*G*) slowly, so as to raise its electrode *M* towards *N*. But when the lever *Q* is raised or turned upwards, the notch in the stirrup lifts the tongue (*l*) off *V*, and allows *U*, which is the heaviest end of the paul, to drop into the teeth of the wheel. This drives the wheel round in a contrary direction, so as to lower the rack (*G*) and draw the electrode *M* further from *N*.

The means by which the end of the lever (*Q*) is raised or lowered are these: *R* is a regulator coil, similar to that described at *g* in fig. 2, one end of the wire of which is connected, through *L* and *K* with the upper electrode *N*, while the other end is connected with the battery. An iron rod (*O*) moves freely up and down in the central hole of the coil, and is prolonged upwards by a stem of wood (*P*), by which it hangs to the end of the lever (*Q*). The iron rod (*O*) passes through a hole in the centre of a cap (*y*), which screws into the bottom of the coil case. Around *O* there is a circular weight called an equilibrium weight, which rests on a small step in *O*, when the latter is raised. When *O* sinks below its medium position, the weight is left behind resting on the edge or rim of *y*. The object of this arrangement is, that when *O* is actuated by a force equal to its own gravity added to half that of the weight which surrounds it, it will have a tendency to return to its medium position, whether it be raised higher or carried lower than that position.

The mode of action of the apparatus is as follows:—The end of the negative wire of the battery is brought into metallic connexion with the rod *G H*, to which the electrode *M* is attached. The positive wire is connected with the coil (*R*) and the upper electrode *N*. The circuit being closed, the current in passing through the regulator tends to raise the iron rod (*O*), which being connected with the lever (*Q*) is counterpoised by the weight *W'*, which screws along an extension of the lever beyond the fulcrum (*a*).

To put the lamp into adjustment, the driving gear being wound up, and the battery in a fit state of activity, after closing the circuit, the lever (*Q*) is raised by the hand until the electrodes have separated to the greatest extent compatible with obtaining a permanent light from them, and the weight *W'* is screwed backward or forward until it keeps *O* balanced, just so as not to sink below its medium position. There is a contrivance, not shown in the drawing, by which, when the lever, influenced by the rod *O P*, is in the above position, the motion of the crank spindle (*S*) is arrested, so that the electrodes remain stationary; but if the lever should be raised or depressed, the crank revolves, and giving motion to the arbor (*U V*), counteracts such effect. If the circuit should from any cause be broken, the rod *O P*, falling below its medium position, would depress the lever (*Q*), and give motion to the wheels by which the electrodes would be brought into contact so as to re-establish the current; and the current, causing the rod *O P* to rise into the coil, and the lever (*Q*) to be elevated, would give motion in an opposite direction, so as to separate the electrodes to the distance for which the adjustment had previously been made.

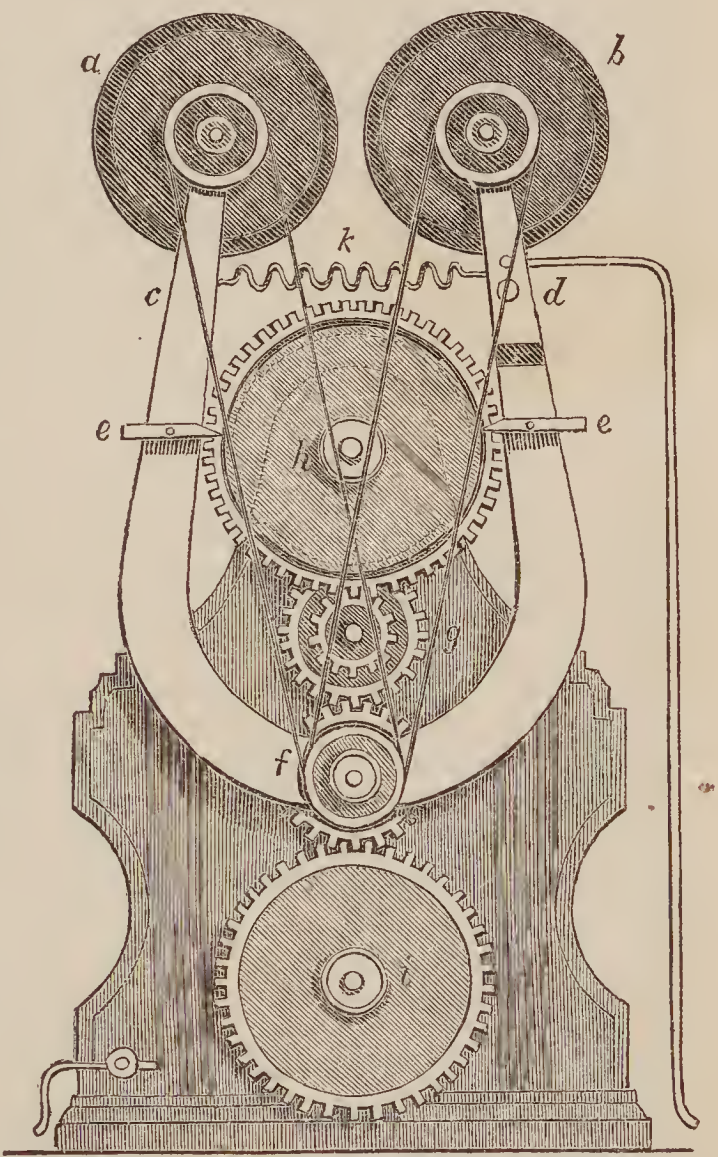
3. The patented apparatus for obtaining a constant and uniform light by the ignition of a metallic wire, is very simple. It consists of a loop or coil of iridium wire enclosed in a glass globe from which the air has been exhausted. There is nothing new in this method of developing the light, excepting in the substitution of iridium for platinum.

I understand that it has been more recently suggested to use platinum wire coated with iridium by means of electricity.

Such are the means proposed by Mr. Staite for obtaining light by electricity; but the public have hitherto had no satisfactory evidence of the efficiency of these means. I believe that in no instance has the light been exhibited without interruption for more than a few minutes.

Other means have been proposed and patented for the same purpose. In July, 1848, a patent was taken by Mr. Lemolt, for certain improvements in apparatus for lighting by elcctricity. Fig. 4 represents Mr. Lemolt's apparatus for maintaining an uniform distance between the charcoal electrodes. In this case the electrodes (*a b*) are made in the form of discs, which are mounted on two arms (*c d*) so as to admit of their revolving on their axes. The arms (*c d*) are separately fixed to an axis (*f*) so as to move freely to or from each other. On the axis (*f*) is also fixed a pinion which gears into a wheel (*i*), which is in communication with some moving power, such as clockwork, within the frame of the apparatus. The axis *f* has also a chain pulley over which pass two endless chains, which give a rotary movement to the electrodes. Another pinion (*g*), is actuated by the pinion *f*, and gears into the wheel *h*, on the face of which there are two or more cams, which by their movement admit of the gradual approach of the electrodes. For this purpose, two adjustable stops (*e e*) are fixed to the arms (*c d*), and the ends of these stops are brought into close contact with the peripheries of the cams, and adjusted so that the electrodes shall be at a proper distance apart. The arms are drawn together by a spiral spring (*k*), and the distance to which they are separated will therefore be regulated by the wheel *h* and its cams.

Fig. 4.



The wires being attached to the battery, and motion imparted to the discs (*a b*), and to the wheel (*h*), the circuit is first closed by bringing the discs together, and then the discs are separated to the proper distance for the production of light, and the stops adjusted to that distance. By the revolving motion of the discs new surfaces are constantly presented to each other, and the old and worn surfaces in passing through the stirrup in the arms to which they are fixed are cleared from any adhering dust before coming round to be again submitted to the action of the electric current. The wheel (*h*), which has a slower motion than the discs, with each revolution, admits the stops on to a smaller part of the cams, by which means the arms are drawn nearer together, so as to compensate for the reduced diameters of the discs as they become worn.

Both Mr. Staite and Mr. Lemolt have patented certain modifications in the batteries which they recommend to be used for obtaining the electric light, but there is nothing deserving of particular notice in reference to these, so called, improvements. Mr. Staite calls his patented battery, "the perfluent battery," the exciting fluid being made to run from one cell to another throughout the whole series, and thus to become fully saturated with the metal before it passes out of the battery. There are obvious disadvantages in this arrangement, and, indeed, it would appear as if the object of the patentee had been to invent something new, rather than to improve on what was previously known in reference to galvanic batteries. Mr. Lemolt's patented battery is a modification, with very slight variation, of Bunsen's battery.

I am informed that the patented batteries have not been used by the patentees in the public exhibitions which have been made of the light.

Having now described the means which have been proposed and patented for keeping the charcoal points of an electric light apparatus adjusted, and otherwise giving permanence to the light obtained by electricity, I purpose, in the next place, explaining the conditions which tend to modify the effects in these applications of the electric force.

We have hitherto only considered the effects produced under one set of circumstances. We have used a battery of sixty cells, united in one series, and with this the light has been developed in two ways,—by rendering a platinum wire incandescent, and by igniting the ends of two charcoal electrodes, and then separating the points, by which latter means the greatest amount of light is obtained. In these experiments the platinum wire and charcoal points have been exposed to the free contact of atmospheric air. Under these conditions we have produced a comparatively feeble calorific effect upon the platinum, but an arc of light of considerable length and great intensity has been obtained with the charcoal.

We have now to observe how the effects may be modified by different arrangements of the battery, by the condition of the ignited bodies, and by the media by which they are surrounded.

In showing the effects of different arrangements of the battery, I will employ but one kind of battery, namely Grove's, of which sixty cells will be used.

This battery is now arranged with the cells in one series, so that the current of electricity, which starts from the zinc end of the battery, passes through all the cells, and thus acquires great intensity. But

the quantity of electricity in the current is that only which any separate cell could produce.

We here have a comparatively small quantity of electricity in a high state of tension. The power of the battery is now adapted for overcoming resistances. The current would pass through a considerable length of an imperfect conductor, and this is the kind, and the only kind, of advantage gained by increasing the extent of the battery in this way. The space between the separated charcoal points is an imperfect conducting medium; and while the battery is arranged, as at present, in one series, this space may be extended to the length of half an inch or more, without breaking the circuit. So also, if we pass this current of electricity through a wire which is a bad conductor, such as platinum, it will be found that the sixty cells thus arranged will not heat a thicker wire to redness than would a battery of twenty, or even ten, of the same cells. The platinum wire becomes heated and incandescent because it offers resistance to the current, and the resistance increases with the increased length of the wire, so that by lengthening the wire we may at last stop the current, the resistance becoming greater than the tension or intensity of the force is capable of overcoming. The length of wire, then, which we are thus able to heat to redness, will depend on the *tension of the current*, or, what is equivalent, on the number of cells in series in the battery, just as does the length of the arc of light between charcoal points; and the diameter of the wire thus heated will depend on the *quantity of electricity*, or the number of polar chains in the current, which is influenced by other conditions, and is almost wholly independent of the number of cells in series.

Having thus observed the effects produced by sixty cells in one series, we will now alter the arrangement.

Of the sixty cells which have been used twenty are of larger size than the others. If we use these twenty cells in a series, disconnecting the other forty, it will be seen that the arc of light produced between the charcoal points is shorter, as also is the length of wire that we can heat to redness; yet we get a flame of greater diameter with the charcoal, and can heat a thicker wire.

It is important to be aware of this result, for we thus find that when there are cells of different sizes or degrees of activity in a series, the quantity of electricity will be that produced by the smallest or least active cell among them. The larger size, or better condition, of any part of the series, as compared with other parts, is of no avail—the least powerful cell governs all the others, and reduces them to its own standard.

We have thus obtained a greater quantity of electricity from twenty cells than from a series of sixty, of which this twenty formed part, the latter being of larger size than the others.

We may now introduce another set of twenty cells into the battery, but in doing this they shall be united in a different arrangement from that first adopted. Instead of having them all in one series, we will now have them in two series. By this means we do not increase the tension or intensity of the current, but we get a greater quantity of electricity. If the second twenty cells be the same as the first, the quantity will be doubled, but the intensity will still be that of twenty couples.

We can now heat to redness a wire of much greater diameter than we could before, and we get a thicker arc of light with the charcoal.

By adding still another set of twenty cells in a third series, we shall have the sixty cells in operation, producing three times the quantity of electricity that we originally obtained from the same battery arranged in one series. The battery is now adapted for producing powerful calorific effects. Platinum wire of considerable size may now be ignited to a white heat, the more fusible metals deflagrated with great brilliancy, and the magnetic effects which the current is capable of inducing in surrounding bodies, will be found to be very powerful.

[The different arrangements of the battery were illustrated by drawings.]

Such are the modifications in the effects, resulting from different arrangements of the battery. There are other modifications, which are caused, either by varying the nature or condition of the conducting medium in which the heat and light are developed, or by alterations in surrounding circumstances which exercise an influence on the development of the heat and light.

Thus, for instance, in getting the light from charcoal points, the effect will depend, in some measure, upon the quality of the charcoal. If the charcoal be soft and porous, the points will be very rapidly destroyed when a powerful current of electricity is transmitted. Hard and compact charcoal is required if the effects are to be long continued.

Box-wood charcoal possesses a tolerable degree of compactness, but is deficient in hardness. It yields an exceedingly bright and pure light, but wears away rather quickly.

Hard coke, especially that which is sometimes found coating the inner surface of the gas-retorts, possesses qualities which render it peculiarly well adapted for affording a steady and continuous light. The light obtained from coke points, however, is not so bright or so white as that afforded by good box-wood charcoal.

Mr. Staite has used with advantage hard coke charcoal, which has been dipped into melted sugar and then calcined in closed tubes, by which means the interstices of the porous coke are filled up with the charcoal of the decomposed sugar, and the qualities of hardness and compactness are thus well combined.

The impurities present in some varieties of charcoal affect the quality, and sometimes also the quantity of light emitted. Coke frequently contains a good deal of siliceous matter, which appears to diminish the light. Certain saline bodies alter the character of the light, and this is sometimes accompanied by an increase in the quantity of light.

[The effect of some saline bodies in increasing the amount of light was shown in a very marked manner, by using charcoal points which had been soaked in solution of chloride of sodium, and subsequently dried. A very large and intensely luminous flame was thus obtained, greatly surpassing the effects produced in any other way.]

Now, in all the cases hitherto adduced, the differences in the light produced, where the electric force has been uniform, have been caused by alterations in the nature or condition of the conducting medium. Similar modifications, however, are sometimes caused by alterations in the atmosphere by which the conducting medium is surrounded.

In effecting the ignition of a platinum wire, or of charcoal, the intensity of the light is very much augmented, and the results in other respects rendered more satisfactory, by rarefying or completely removing the surrounding air. As the air is removed from the receiver in which the platinum is heated, the ignition becomes much more intense, and the light consequently much stronger.

Similar results are also obtained with charcoal, and in this case we derive a two-fold advantage from the removal of the air. Not only is the light increased, but the combustion of the charcoal is entirely prevented.

We thus see that the effect—the production of the light—does not necessarily involve any chemical action at the point at which the light is developed. The chemical action is in the battery. There is not necessarily any chemical action where the light is produced; yet, if the charcoal be surrounded by air, there will be combustion to a certain extent, and carbonic acid produced: but by enclosing the charcoal in a vacuum, or in a vessel filled with carbonic acid, that result is obviated.

The influence which the surrounding atmosphere exercises in modifying the calorific effects of a current of electricity is very remarkable, and, in some respects, at present, inexplicable.

Having observed that the rarefaction of the air surrounding the ignited platinum wire, renders the ignition more vivid and the light stronger, it might have been inferred that the effects would be similarly increased by substituting the lighter gases, such as hydrogen, for atmospheric air. Experiment teaches us, however, that this is not the case. On the contrary, a wire which is rendered incandescent by a current of electricity when surrounded by atmospheric air, will transmit the same current without any such effect being produced, when it is surrounded by hydrogen gas.

It is obvious, therefore, that it is not merely the tenuity or rarefaction of the atmosphere upon which the result depends, but that different gases, when surrounding the conducting medium, produce specific effects in modifying the development of heat and light.

I have now described the most important conditions by which the effects of the galvanic battery are modified, in its application for the production of light; and we may proceed to apply some of the principles which I have endeavoured to explain and establish, in testing the probability of a realization of the prospects held out by certain speculative adventurers, who have represented the voltaic battery as an economical and advantageous source of light, which is speedily to supersede gas, oil, and candles.

The defects in the ordinary means of obtaining light, and the evils attendant upon the application of such means, are universally admitted. No one denies that the light thus obtained is imperfect, and that its production is accompanied by the conversion of valuable substances into worthless and deleterious products, by which the atmospheres of our houses are rendered less wholesome than they would otherwise be.

No one denies that the electric light is most brilliant and pure, and that its production does not necessarily involve any deterioration of the quality of the surrounding atmosphere, or the conversion of valuable substances into worthless products.

With reference to these broad and general statements, there is no

difference of opinion. The projectors of the electric light, therefore, appear to have a good foundation on which to establish their claim for the superior advantages of the means they propose for producing light.

On a superficial view of the subject, there is some show of reason in their statements, that we are wastefully destroying coals, and oil, and wax or tallow, in the production of bad light, and of noxious gases, by combustion; while, in the manufacture of valuable chemical compounds, abundance of pure light might be obtained as a secondary product, the collection and application of which has hitherto been neglected.

It has been suggested that the production of light should be associated with the manufacture of metallic compounds, such as sulphate and oxide of zinc, sulphate of copper, nitrate and carbonate of lead, &c. In every case, when these compounds are made by dissolving the metals in the respective acids, electricity is developed, but in most cases it is not collected or applied. The galvanic battery is an apparatus by means of which such application might be made.

Is there then, anything unreasonable in the proposition that manufactories of metallic compounds should be established like gas works, and that the electricity thus obtained should be carried into our streets and houses through wires, as gas now is through pipes, to be applied as a source of light? There is something imposing in the boldness of such a proposition, and one naturally clings to it in the hope that it might be practicable. In the present state of our knowledge, however, such a scheme must be considered as perfectly chimerical, and unsupported by any experimental results. It may be thought that the power which appears so manageable at the lecture table—which we lay on or turn off with such facility, and which we can develop in any part of the circuit—might be conducted to any or every part of a town, and used as required. There would indeed be no difficulty in conveying the power wherever we wished for it, but there would be serious and insuperable obstacles to its development in the form of light at many points in the circuit at the same time. We obtain light as the result of a transformation of the power in its effort to overcome resistance. It requires a considerable accumulation of force to give an arc of light with charcoal points of half an inch in length; and having thus applied this amount of force, transforming it into heat and light, it is no longer similarly available to us in any other part of the circuit.

Wherever electricity is to be used as a source of light, I can see no other method of applying it than by having a separate battery for every light. This would undoubtedly be the case with the charcoal light, in consequence of the difficulty of otherwise maintaining an unbroken circuit. Now this fact is sufficient to dispose of the question as to the probability of the electric light being substituted for lamps and candles in our streets and houses. I believe, however, it has been suggested, that every house should be provided with a galvanic battery as a source of light, and that carts should be sent round from day to day to collect the sulphate of zinc or other metallic salt formed in the process; but those experienced in the use of voltaic apparatus will know how to estimate the probability of such a plan being put into effect.

It is not for general use that there is any present prospect of applying the electric light, but in some special cases where light of great

intensity is required, as, for instance, in signal lights, on railroads, and in light-houses. There are probably no difficulties in the application of the electric light in such cases, that may not be overcome; but I think it would be saying too much to admit that this object has been accomplished by any of the contrivances hitherto suggested.

ERRATUM.

In the last number of this Journal, at page 469, tenth line from the bottom, *for* "minute" *read* "hour."

ORIGINAL AND EXTRACTED ARTICLES.

ON THE PREPARATION OF SULPHURIC AND PHOSPHORIC ACIDS.

BY MR. LEWIS THOMPSON.

A SHORT time ago my friend, Dr. Ure, pointed out to my notice a fact, which, though known, perhaps, to many, was then new to me, *viz.* that sulphate of lime in solution is copiously precipitated by oxalic acid—it immediately occurred to me to ascertain whether this decomposition, by what is termed simple elective affinity, was complete, or, as in many similar cases, only partial. A careful investigation of the matter has satisfied me, that when the solution of oxalic acid is not very concentrated, sulphate of lime in fine powder thrown into it is completely decomposed; and if the experiment has been made with due care nothing but sulphuric acid remains in solution. In fact, I have by this means on evaporation prepared pure oil of vitriol; and it seems to me that when matters of great moment demand the use of sulphuric acid, absolutely free from the suspicion of metallic contamination, this mode of preparing that article deserves notice. In the application for instance of Marsh's test, such acid would enable an operator to speak with more confidence than can now be done even with distilled acid. No harm beyond the loss incurred can result from using an excess of oxalic acid in this process, as it is of course destroyed during the concentration of the sulphuric acid.

Proceeding on the same idea, phosphate of lime may be similarly decomposed, and I can safely recommend this as an easy and economical mode of preparing phosphoric acid: five parts of finely powdered bone ash, six of oxalic acid, and twenty or thirty of water, well stirred together, will give a solution, which, when filtered, will not be disturbed by oxalic acid or an alkaline carbonate. If, however, this should be the case, oxalic acid ought to be added so as to precipitate the whole of the lime, after which the solution may be evaporated to dryness. In this case as in that of the sulphuric acid a slight excess of oxalic acid is rather

beneficial than otherwise, for obvious reasons. It is unnecessary to say that an economy would result to makers of the binoxalate of potash by decomposing the residuary oxalate of lime by a boiling solution of carbonate of potash. As commercial oxalic acid always contains a portion of saccharine and other organic matter, which is charred and blackened during the concentration of the sulphuric and phosphoric acids, it ought to be purified by crystallization before using it for these purposes.

Fluoride of calcium is not decomposed by oxalic acid, even when silica is present. This, therefore, enables us to separate this substance from the sulphate and phosphate of lime, for oxalic acid converts such a mixture into fluoride of calcium and oxalate of lime, which being heated to redness and acted on by dilute muriatic acid, leaves the former salt undissolved.

Byker Bar, Newcastle on Tyne,
April 18, 1849.

ON THE PREPARATION OF COLLODION.

BY J. B. EDWARDS, F.C.S., M.P.S., &C.

Much difference of opinion appears to exist among some distinguished French Chemists, as regards the solubility in ether of the ordinary explosive gun-cotton, as described by Mr. Maynard, in America; but since the discovery of M. Mialhe's process with nitrate of potash, I am not aware of any experiments having been made on the subject, and therefore trust my experience may be of some interest.

In *L'Union Médicale*, of the 7th September last, M. Malgaigne says, "The *American Journal of the Medical Sciences* contains an extract from a letter by Mr. Maynard, containing a formula for the preparation of collodion, *which might be supposed to be authentic*. According to this formula the cotton is to be treated with nitric and sulphuric acids, dried, and dissolved in pure sulphuric ether."

"Upon reading this letter, I lost no time in applying to M. Foy, Pharmacien to the Hôpital St. Louis, to obtain a quantity of this liquid; but he in vain attempted to prepare it either from the *acids united* or the *nitric alone*. I afterwards prevailed on MM. Dublanc and Mialhe to undertake its preparation, but they were not more successful, and *it was evident* that a formula which failed successively in the hands of *three* such *distinguished Chemists* WAS INCORRECT; M. Mialhe however, undertook, at my request, the investigations which led him to the discovery of the method by nitrate of potash and sulphuric acid, which has always proved successful. The cotton so prepared does not deflagrate as usual, and leaves behind a carbonaceous residue on combustion. *The explosive cotton he found insoluble in ether.*

In the same periodical, shortly after, appeared a notice from M. Salmon, Surgeon to the Hôtel Dieu, of Chartres, who states that "contrary to the experience of MM. Foy, Dublanc, and Mialhe, I

assert that collodion may be easily prepared by dissolving gun-cotton made by the mixed acids in sulphuric ether. *I have always prepared the adhesive liquid* by the method of the American author. The preparation of collodion, according to the process of MM. Millon and Gaudin, revived by M. Mialhe, is not always practicable, and is liable to great variations from the inconstancy of the product."

On the above, Soubeiran, in the same journal, observes,

"I, like many others, have attempted to operate with a mixture of the monohydrated nitric and sulphuric acids. I have employed them sometimes with equal weights, at other times with equal volumes, and immersed the cotton for different periods from three minutes to an hour, and I have *never found it to dissolve in ether.* I do not, however, contend that it is impossible to do so, but I must think the other a more certain method, though the employment of the mixed acids has the advantage of convenience over the other."—*P. T.*, Vol. iii., No. cvii., p. 665.

Professor Simpson states that "usually an ounce of strong sulphuric ether will dissolve thirty grains or more of gun-cotton *in the course of a few hours;* but to form a complete pulp it will require to stand for a day."—*Pharmaceutical Journal*, Vol. viii., No. ii., p. 86.

My own experience coincides with that of M. Salmon. I take equal volumes of strong sulphuric and strong *fuming* nitric acids, mix them in a mortar or other convenient vessel, then immerse finely-carded cotton in small portions, allowing each to remain about *one minute*, then plunging it into a large quantity of water, and teasing it out with a glass-rod, so as to become as loose as possible, yellow fumes arise from the cotton, and are washed away, and it is then perfectly white. This is then well washed from acid and dried, and it then INSTANTLY and PERFECTLY *dissolves in commercial sulphuric ether*, forming either a semi-solid jelly or thick liquid, according to the quantity of ether added. This is the *constant* and *uniform* result of several experiments I have made.

This cotton is also *highly explosive, and leaves no carbonaceous residue*, when fired.

The sources of fallacy, I imagine, are, either from employing weak acids, too long immersion, or ether of high rectification. The latter should not contain water, but sufficient alcohol to reduce its specific gravity to about 760° or 770°. Its solvent action is then instantaneous, and not as Simpson states, from three hours to a day!

I consider this process superior on many accounts to that of Mialhe. It is more readily prepared, and requires less washing than when entangled with sulphate of potash. It is explosive, and therefore answers both purposes. I have dissolved some with equal readiness that has been thus prepared more than a month; so that it may be convenient to keep the cotton prepared, and dissolve small quantities as frequently as required, and thus obviate the loss by vaporization which ensues on keeping a stock of the solution prepared.

I was led to make these experiments for Mr. Higginson, Surgeon of this town, who recently exhibited at the Literary and Philosophical Society, some evaporated collodion under the microscope, which had all the appearance of distinct and definite acicular crystals; and Mr. H. stated that he had made very frequent examinations, and observed an uniformity in their shape and arrangement, which convinced him that these were crystals of collodion, and not filaments of cotton.

It was suggested that there might be minute crystals of nitrate or sulphate of potash, and I therefore undertook to prepare some collodion without any salt to interfere: in this I have succeeded; but have not yet heard the result of Mr. Higginson's more recent investigations.

Allow me to caution those who are not in the habit of preparing gun-cotton, as to its highly explosive nature. The gaseous results of combustion, which of course at once occupy a very large space in the air, are thus given off at a *very high temperature*, so as to possess the property of inflaming other portions of cotton at a very considerable distance; and thus, on trying whether the cotton is sufficiently dry, by exploding a small portion, it should be removed for some distance from the remainder, or the whole will ignite, and if the operator be standing over it, his face may be severely burned, though no *flame* reaches it, the resulting gases being quite capable of blistering the skin. It is better to operate on small portions at once.

Berry Street, Liverpool.

UMBILICUS PENDULINUS *(DE CANDOLLE)*.
COTYLEDON UMBILICUS *(LINN)*.
NAVELWORT OR WALL PENNYWORT.

Nat. Ord. Crassulaceæ.

We have been favoured by Messrs. Godfrey and Cooke, through Mr. Ince, with a drawing of this plant, from which the annexed woodcut is taken. Mr. Ince observes that the plant has been long known as a popular remedy in hysteria, and has lately been recommended for epilepsy by Mr. Salter, of Poole, in an article published in the *Medical Gazette* of March 2, 1849. The following remarks are quoted from Mr. Salter's paper:—

"The Cotyledon umbilicus is stated by Withering to be a rare plant; its common habitation would appear to be that of old walls and rocks, but it grows abundantly in this neighbourhood on dry sandy banks. For the information of those unacquainted with the plant, I would add, that in the Linnæan arrangement it belongs to the class *Decandria*, and order *Pentagynia*, but in the natural classification it will be found under the order *Crassulaceæ*. It is about six inches high; the leaves are succulent, fleshy, and peltate*; it flowers in June and July, in a long spike of blossoms, accumulated on one perpendicular flower stalk; the corolla is bell-shaped, and of a pale yellow colour; the stem or flower-stalk is somewhat purplish, with a few small leaves at its lower part. At the time of flowering, the leaves become thin and shrivelled, from yielding their juice to the stem and flowers.

The plant may be used as long as the leaves remain green and succulent, and every part of it be employed for the expression of the juice, with which the leaves, however, are the most abundantly supplied.

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* In collecting the leaves of the *Cotyledon umbilicus*, care should be taken not to confound it with an umbelliferous plant, the Marsh Pennywort (*Hydrocotyle vulgaris*), which it somewhat resembles; I have known the mistake occur more than once. A view of the entire plant, and a knowledge of the locality in which it grows—the *Cotyledon* always being found in very dry, and the *Hydrocotyle* in moist places—will be conclusive.

UMBILICUS PENDULINUS—(*De Cand.*)
COTYLEDON UMBILICUS—(*Linn.*)

ON EDIBLE BIRDS' NESTS*.

BY ED. BLYTH, ESQ.
Curator of the Asiatic Society's Museum.

Genus Collocalia, G. R. Gray (Swiftlets).—These are true *Cypseli* in structure, but comparatively feeble, having the first quill shorter than the second, and the wings and tail broad, the tail especially much resembling that of a humming-bird, with its feathers of even length, or nearly so. The feet and naked tarsi resemble those of *Acanthylis*, having the hind-toe well opposed; but are comparatively slender, though of proportionate strength to the rest of the conformation. The breast-bone and its ridge remain incompletely ossified. Not more than three species appear to be known, though perhaps others require discrimination; they are of small or minute size, and are confined in their geographic distribution to the Indian, Indo-Chinese, and Austral-Asian countries, as far as New Guinea. Certain (if not all) of them produce the valued "edible nests" of commerce.

"In Java," remarks Sir Stamford Raffles, "these birds not only abound amongst the cliffs and caverns of the south coast of the island, but inhabit the fissures and caverns of several of the mountains and hills in the interior of the country. From every observation which has been made in Java, it has been inferred, that the mucilaginous substance of which the nests are formed, is not, as has been generally supposed, obtained from the ocean. The birds, it is true, generally inhabit the caverns in the vicinity of the sea, as agreeing best with their habits, and affording them the most convenient retreats for attaching their nests to; but several caverns are found inland, at a distance of forty or fifty miles from the sea, containing nests similar to those on the shore†. From many of their retreats along the southern coast, they have been observed to take their flight in an inland direction, towards the pools, lakes, and extensive marshes covered with stagnant water, as affording them abundance of their food, which consists of

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* [Mr. Blyth's interesting paper is contained in an unpublished and undated specimen of a "*Plan of an Indian Ornithology*," kindly lent by Dr. Horsfield, with whose permission it is reprinted in the *Pharmaceutical Journal*.—J. P.]

† See also Hooyman, in the *Batavian Transactions*, III, 95; likewise Marsden; and Sir G. Staunton, in his narrative of the Earl of Macartney's embassy to China; while Mr. G. R. Gray relates (rather as if a novelty), on the authority of Mr. Hugh Cuming, that in the Philippines the nests are found inland to the distance of fifty or sixty miles. One species has, in India, been only observed hitherto in the mountains of the interior, at a distance of many hundred miles from the sea. According to Mynheer Hooyman, however, the nests (even of the same species) vary somewhat in quality in different neighbourhoods. Thus, of those obtained in two inland localities, not very far apart, and but a few hours' journey distant from Batavia, he states that the produce of one of these places is at least a third less valuable than that of the other, which latter is in its turn reckoned very inferior in quality to the nests gathered at Ternate and other islands, chiefly to the eastward of Borneo. These last, however, we suspect are not the produce of the same species.

flies, musquitoes, gnats, and small insects of every description. The sea that washes the foot of the cliffs, where they most abound, is almost always in a state of the most violent agitation, and affords none of those substances which have been supposed to constitute the food of the "Esculent Swallow." Another species of Swallow [Swift?] on this island forms a nest, in which grass or moss, &c. are merely agglutinated by a substance exactly similar to that of which exclusively the edible nests consist. This substance, from whatever part of these regions the nests be derived, is essentially uniform, differing only in the colour, according to the relative age of the nests. It exhibits none of those diversities which might be expected if it were collected casually (like the mud employed by *Hirundo urbica*, and the materials commonly employed in nest-making), and applied to the rocks. If it consisted of the substances usually supposed, it would be putrescent and diversified.

"Dr. Horsfield," continues Sir St. Raffles, "thinks that it is an animal elaboration, perhaps a kind of secretion*:" and Sir Everard Home, after examining the stomach of one of these birds, pronounced his decided opinion that the edible nests are composed of a substance secreted by the glands of that organ†. M. Poivre, who in his often quoted communication to Montbeillard (Buffon's *Hist. Nat. Ois.*, VI. 688 *et seq.*), advocated the exploded notion that the substance was collected from the sea, remarks that there have been seen threads of this viscous matter hanging from the bills of these birds; and that it is believed, though without any foundation, they were derived from the stomach during the nesting season. M. Hooyman long ago (1781) was of opinion that the substance of them has nothing to do with sea-foam, but is elaborated from the food of the bird‡." The Rev. J. Barbe adds, to his account of the nests gathered in the Nicobars, &c., quoted in the sequel, that—"The Chinese say, that when the nest is taken before it is completed, the bird makes another, but of an inferior quality: and it appears that it exhausts itself in building the second; the nest being spotted with blood§." The prevalent opinion is that the substance is secreted by the salivary glands: but though, on carefully dissecting a specimen of *C. fuciphaga*, killed when there is reason to suppose that it had young (and therefore too late in the season), no remarkable development either of the salivary or of the proventricular glands was apparent, yet we are fully convinced that it is secreted by the latter, from examination of other *Cypselidæ;* even in *Cypselus balasiensis*, which employs so little mucus, which is laid on merely to make its nest adhere, we have detected *in situ* stringy clots of it, while the proventricular glands were adequately developed for its production. The animal origin of the edible nests is at once detected by simply burning a bit of one: and Mr. Laidlay informed

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* *History of Java*, I, 51.

† Home, as cited in Griffith's *Animal Kingdom*, VII, 98. [Sir Everard Home's paper, entitled "*Some Account of the Nests of the Java Swallow, and of the Glands that secrete the Mucus of which they are composed*," was published in the *Phil. Trans.* for 1817, p. 332.—J. P.]

‡ *Bataviaasch Genootschap*, III, 97.

§ *J. A. S.* XV, 363.

ds, that upon analysis, he found the constituent elements to be those of inspissated saliva*. Looking to a number of them, and more particularly to their under surface, the quantity laid on by the bird at each time, in successive layers to the rim, is in many conspicuously apparent, and this quantity is much more than the salivary glands could well be supposed to elaborate. Each addition consists of a linear collop continued along the whole semicircular rim of the nest, which latter forms generally a shallow saucer, imperfect where affixed to the rock, and when completed having the place of attachment on either side much thickened. It is evidently in a very viscid state when laid on, adhesive at first, ductile and tenacious while drying; so that on the upper surface threads of it are pulled forth by the bird, and more or less crossed into a kind of net-work, as if to bind together the vertical layers, some of which are often partially unadherent. These threads, however, consist of a little additional matter to that originally laid on in the successive marginal deposits. Mr. G. R. Gray writes—"The formation of the nest differs with the species. Some appear to be formed of flakes or threads cemented together, making an almost solid nest; others are composed entirely of viscous matter. The exterior exhibits many nearly straight threads, which incline or are attached to each other; strengthened in front by some few short pieces of slender sticks" (this we have never seen). "The interior, which is rather shallow, shows many layers of irregular net-work, formed of a multitude of threads that cross and re-cross each other in every direction."

When newly formed these nests are perfectly clean, of a yellowish-white colour, and wholly soluble in water: but when old they become deeply soiled and mixed with feathers, and their value is immensely deteriorated. Hence, as Marsden remarks, "they are distinguished into white and black, of which the first are by far the more scarce and valuable, being found in the proportion of one only to twenty-five. The white sort sells in China at the rate of 1000 to 1500 dollars

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* *J. A. S.* XIV, 543. "Upon this supposition, however," Mr. Laidlay has since added, "I do not see how it could be deposited in the form of layers, as it is. The mechanical structure of the nest may be very nicely exposed by soaking it for a few hours in rain-water."

[The edible birds' nests have been examined chemically in 1814, by Döbereiner (Schweigger's *Journ. für Chemie u. Physik*, Bd. xi, S. 303, 1814), in 1817 by Professor Brande (see Home's paper before quoted), and in 1838 by Mulder (*Pharmaceutisches Central Blatt* für 1839, S. 320.). In Schweigger's *Journ.*, Bd. xxii, S. 259, Brande's analysis is erroneously stated to have been made by Marcet, and this error has even crept into Leopold Gmelin's usually most accurate *Handbuch d. theoret. Chemie*, Bd. ii, Abt. ii, S. 1459, 1829. All the analysists agree that the substance of the nest is of an animal nature. Mulder examined a nest brought from Java by Blume; he found its composition to be as follows: 90.26 *Neossin* (a new substance whose composition is represented by the formula $C_{11}\ H_{17}\ N_4\ O_2$), 0.53 of an animal calcareous salt soluble in water, but insoluble in alcohol, 0.22 of a white solid fat, 0.77 of sulphate of soda, 3.47 of chloride of sodium with traces of chloride of magnesium, 4.75 of phosphate of lime and phosphate of magnesia, and traces of carbonate of lime and carbonate of soda.—J.P.]

the *picul*† (according to the *Batav. Trans.* for nearly its weight in silver); the black is usually disposed of at Batavia, at about 20 or 30 dollars for the same weight, where I understand it is converted chiefly into glue. * * * When the natives prepare to take the nests, they enter the caves with torches, and forming ladders of bamboos, notched according to the usual mode, they ascend and pull down the nests, which adhere in numbers together from the sides and top of the rock. I was informed that the more regularly the cave is thus stripped, the greater proportion of white nests they were sure to find, and that on this experience they often make a practice of beating down and destroying the old nests in larger quantities than they trouble themselves to carry away, in order that they may find white nests the next season in their room." According to Heer Hooyman, the *C. nidifica* is about two months preparing its nest, and lays two eggs, which are hatched in fifteen or sixteen days: and of a species which would appear to be *C. fuciphaga*, M. Poivre informs us that each of the nests which he observed contained two or three eggs or young; Sir G. Staunton, of doubtless the same species, asserts that it lays two white eggs.

The nests of the *Collocaliæ* are placed against the sides and roof of deep caverns of chiefly limestone rocks, at distances from the entrance varying from fifty to several hundred feet. Wherever (as we have seen) these caves occur, whether inland or in cliffs overhanging the sea, the birds resort to them alike in prodigious numbers: building commonly in successive layers, many nests together; but always where the cavern is perfectly dry, for obvious reasons. Every fitting site is usually crowded with the nests. The entrance to the cavern may be large, or so small as barely to admit the birds and their Bat-companions: and inland the rocks are sometimes clad externally with dense jungle. At break of day the birds issue forth with a great rush, at which time the Kites (*Haliastur pondicerianus?*) commit much havoc among them (being therefore destroyed by the Javanese and others): and in fine dry weather they fly very high, like the rest of the group, rising till they are out of sight; and low in rainy weather: returning early in the afternoon direct to their cavern, from which they do not again issue till the following morning. Most of these details are gathered from M. Hooyman's paper on *C. nidifica*.

The Rev. J. Barbe remarks, of the nests of *C. fuciphaga* gathered at the Nicobars, at Mergui, &c., that—"They are of six qualities: the first, of a fine whitish colour, is obtained by taking the nest before the Swift has laid its eggs. This quality is sold at Penang from 40 to 50 dollars the *katee*" (*!*) "The second quality, of a brownish colour, is obtained by taking the nest when the bird has laid her eggs. This quality is sold at Penang from 20 to 30 dollars the katee. The third quality is of a dark colour, mixed with blood and feathers, being obtained by taking the nests when the young birds have flown; the price of this is very low." The gradual exhaustion of the bird, according to Mr. Barbe's information, has been already cited. "The manner in which the Chinamen prepare the nest," continues the same gentle-

* 133⅓ lbs. avoirdupois. The current price in China at this time is 18 dollars and upwards per *catty* of 1 lb. 5⅓ oz., or $\frac{1}{100}$ *picul*; *i. e.*, £4 10*s.* 8*d.* per lb., reckoning the dollar at 4*s.* 3*d.*

man, "is to steep it in water during one night; then with great trouble they clean it: this being done, they boil it in water, to which they have added some sugar-candy, till the whole forms a jelly: one nest prepared in this manner is enough for one person.*

The people who gather the edible nests practise a variety of superstitious ceremonies in relation to them, which belong rather to their history than to that of the birds, and therefore need not be here described. But another point of interest arises respecting the actual species which produce them; and it would seem that all the authorities to whom I have access, who have discriminated different species of these birds, are more or less in error. Firstly, as regards the *Hirundo esculenta* of Linnæus (founded on Brisson's description of one of M. Poivre's inaccurate drawings), there is no reason to suppose that this as described, with yellow irides and white-tipped tail, has any prototype in nature; the latter would be an anomaly throughout the *Cypseladiæ*, but may refer perhaps to the white tail-markings of some real *Hirundo*, erroneously supposed to be the constructor of the edible nests.† Dr. Horsfield gives the species termed *Lawet* by the Javanese as *Hirundo esculenta*, Osbeck, stating that the specimens which he examined in Java, and those which he took to England, differ from Latham's description in being uniformly of a blackish colour, without a white extremity to the rectrices. Another species, the *Linchi* of the Javanese, he gives as *H. fuciphaga*, Thunberg, stating that—"Its nest is constructed of mosses and lichens, connected with the same gelatinous substance which composes the edible nest of the preceding species."‡ This accords with what has been already cited from Raffles: and in an interesting account of Karang Bolong, on the southern coast of Java, and of the birds'-nest rocks there, translated from the *Tijdschrift voor Neerlands India* in the *Journal of the Indian Archipelago*, I, 107 (Sept, 1847), the same two species are distinguished by the names *Lawet* and *Lintye*, and the nest of the latter is described to be "without the least value. The residence of these Swallows" (Swiftlets) "termed *Lintye* in the caves," it is added, "contributes greatly to the injury of the holes, for which reason they are destroyed as much as possible at each gathering. The nests which they make are constructed of grass-stalks. They are, however, of the same form, and are as artfully made as the others."

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* "Birds' nests being very dear," he further continues, "the wealthy Chinamen only can obtain this delicacy. The rich opium-smokers take in the morning a cup of it, for the purpose of refreshing and strengthening their debilitated frames. Persons attacked by consumption, are advised by the Chinese practitioners to take these nests; they prescribe the same to those who are reduced by a protracted illness; and I have seen several persons, who, having made use of this remedy, declared that they found a temporary relief from this refreshing and nourishing food."—*Journ. A. Society*, XV., 363.

† I find, indeed, that M. Montbeillard describes it to have twelve tail-feathers, which bears out the above idea that it may be a true *Hirundo*, and shows that it cannot be a Swift. It was on drawings by M. Poivre that the *Cuculus sinensis* and *C. paradiseus*, Linn., were founded; the one representing a Corvidous bird (*Psilorhinus*), and the other a Drongo (*Edolius*), each represented with a reversed outer toe!

‡ *Linn. Tr.*, XIII, 143.

Heer Hooyman likewise states, that besides the *Lawet* (*Waled* or *Boerong** *Daija* of the hill Javanese), "other species resort to the same caverns, which are named *Momomo*, *Boerong itam*†, *Boerong zoekoet*, and *Lintje*. These," he adds, "are very similar to each other, excepting the second, which has the head larger, and the feathers of all are entirely black. The nests which they construct are black and friable, composed of a light down" (agglutinated?) "An opinion prevails that the presence of these birds is injurious to the caverns, on which account they are driven away as much as possible." Another writer in the same volume of the *Bataviaasch Genootschap* (p. 248) mentions the *Momos* or *Boerong itam* (thus bringing together M. Hooyman's first two species) as a larger kind, with plumed tarsi, indicating thus a true *Cypselus*, which is probably the constructor of the nests assigned by Dr. Horsfield and others to the *Linchi*. Assuredly, however, the *C. fuciphaga* (Thunberg), *Linchi* or *Lintye* of the Javanese, identical upon comparison with Javanese specimens, would appear to be the sole producer of the numerous nests gathered on the rocky coasts of the Bay of Bengal; and the often quoted notice by Sir G. Staunton, in his account of the Earl of Macartney's Embassy to China, must refer either to *C. fuciphaga*, or to an entirely new species (which is hardly to be supposed in the locality). For he remarks that, "The birds which build these nests are small grey swallows, *with bellies of a dirty white*. They were flying about in considerable numbers; but they were so small, and their flight so quick, that they escaped the shot fired at them‡." This was at an islet off the southern extremity of Sumatra, close to where M. Poivre also observed them, who remarks that "leur taille étoit à peu-pres celles des Colibris§." The birds may have appeared greyish on the wing, but the white belly is characteristic of *C. fuciphaga;* and this particular species occurs abundantly on parts of the coast of the Malayan Peninsula, in the Nicobar Islands and Mergui Archipelago and so high as on certain rocky islets off the southern portion of the coast of Arracan, where the nests are annually gathered and exported to China. From all this range of coasts we have seen no other species than *fuciphaga*, nor does it appear that any other has been observed; and we have examined a multitude both of the adults and of young taken from the nests, collected in the Nicobars and preserved in spirit, all of which were of the same species. Nevertheless, what appears to be *C. nidifica*, inhabits the mountains far in the interior of India, though hitherto unobserved upon the coasts; and it is worthy of notice that *C. fuciphaga* does not appear to have been hitherto remarked inland in this country. The species which builds the edible nests collected on the western coast of the Indian peninsula, as in the group of small islands about eight miles west of Vingorla (which is a little above Goa, and 275 miles from Bombay), commonly known as the Vingorla Rocks, where about one cwt. of them are produced annually, remains to be ascertained.

C. NIDIFICA; *Hirundo nidifica*, Latham: *H. fuciphaga* apud Shaw: *H. esculenta* apud Horsfield: *H. brevirostris*, McClelland,

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* *Burong*, *i.e.* bird. † Literally *Black-bird.*

‡ *Narrative of Macartney's Embassy*, I, 287.

§ See also Valentyn, as quoted in the *Bataviaasch Genootschap*, iii, 247.

P. Z. S., 1839, p. 155 : *H. unicolor*, Jerdon, *Madr. Journ.* xi, 238; referred by that naturalist to *Cypselus*, ibid, xiii, 173, and termed *C. concolor*, *J. A. S.*, xi. 886 (there being a previously described *C. unicolor*). Length 4½ to 4¾ inches, the middle tail-feathers 2 inches, and outermost ⅜ inch longer; wing 4½ inches. General colour fuscous-brown, darker on the crown, wings and tail, which latter have a dull gloss of steel blue or green, below paler. From M. Hooyman's description of this species, we feel satisfied of the identity of the Indian and Javanese birds, which some of the translated accounts had rendered doubtful.

This species, in India first observed in Assam, appears to be a regular bird of passage at Darjeeling, where Capt. Tichell observed flights of them commencing in August, proceeding to the S. W. Mr. Jerdon remarked it "on the Coonoor Pass of the Nilgiris, and about the edges of the hills. It flies in large flocks and with very great speed." Its nests remain to be discovered in this country.

C. FUCIPHAGA; *Hirundo fuciphaga*, Thunberg. A minute species, about 3½ inches in length by 9 inches in expanse, the tail 1½ inch and even, wing 3¾ inches. Colour above blackish, green and purple glossed; below, fuscous-brown, passing to white on the middle of the belly, with whitish edges to the lower tail-coverts. A single large feather, with a distinct supplementary plumelet, grows on the hind-toe, being nearly as long as the toe with its claw; this is always normally present, but is often lost in dry specimens.

This bird is the edible nest builder of the Bay of Bengal, and may prove to be exclusively a coast species, the nests of which are of superior quality to those of *C. nidifica?* In the extreme east it is perhaps replaced by *C. troglodytes* of Mr. G. R. Gray. The Rev. J. Barbe, from personal observation, notices it as "common in the Archipelago of Mergui, the Nicobars, &c., building their nests in the cavities of the rocks, where it is most difficult and perilous to have access. Formerly," he adds, "both Malays and Burmese procured at the Andamans a considerable quantity of these nests, collecting them themselves, or receiving them from the islanders in exchange for their tobacco, &c.*" But it appears that both people "taking advantage of the time in which the natives were on board their vessels, tied them up, and carried them off as slaves." Hence the present hostility of the rude Papuan inhabitants of the Andaman Islands to all foreigners whatsoever.

ADDENDUM.—Edible nests in Ceylon. A most obliging correspondent in Ceylon, Dr. E. L. Layard, informs us that he has learned of a habitat for *Collocaliæ* in that island—"on the banks of a river, thirty miles from the sea, in some caves of a high mountain. A Chinaman rents them from Government, and pays £40 for a period of seven years. This man says there are two kinds of the bird, but does not know much about them; I will, if possible, visit the spot during the 'take,' which comes on four times a year, October being the forthcoming. This quadruple harvest would seem to imply that they do not migrate, as all our other species [of Swift and Swallow] assuredly do."

Our friend Captain Lewis, who saw much of these birds in the

* *J. A. S.*, xv, 363.

Nicobars, having opportunely returned to Calcutta after a long absence, we had an opportunity of submitting the accompanying notice of them to his criticism; and he states positively that he observed but one species in those islands, the *C. fuciphaga*, of which he preserved numerous specimens, both adults and young from the nests, and remarks that they laid two or three white eggs, commonly the latter number, but he thinks he once observed as many as four. The number may, in fact, vary according to season (Captain L. observing them in the cold weather). He remarks that the gatherers of the nests are much given to mislead inquirers who interrogate them on the subject, which may account for the published statements that *C. fuciphaga* does not produce a valuable nest. The notice which we have given, from M. Hooyman, of the manners and building places of *C. nidifica*, he says applies equally to those of *C. fuciphaga* in every particular; and especially he has often remarked that they retire early in the afternoon to their caverns (*i. e.* about 4 P.M.); but he states that the edible nests, as we see them, are only the lining which comes out entire, though independently affixed to the rock, being underlaid by a net-work of some vegetable fibrous substance placed on the ledges, which the gatherers are careful never to remove. Further attention is invited to this subject.

EXPERIMENTS ON DIAMAGNETISM.

BY H. C. ŒRSTED*.

At a meeting of the Royal Society of Sciences at Copenhagen on the 30th of June, I communicated the results of some researches I had made upon diamagnetism, an abstract of which appeared in the proceedings of the Society. During the vacation, I have continued my experiments, and have obtained several new results. As the memoir will not appear for many months, I have decided on giving an abstract which may be communicated to my distant friends.

My researches relate to the celebrated diamagnetic discoveries of Mr. Faraday, and to the extensions they have received from some learned Germans.

Mr. Faraday, in the experiments with his great electro-magnet, met with a class of bodies which are repelled by the two poles of the magnet. One or two examples of this repulsion had been known for some time; but the researches of the illustrious Englishman has rendered this fact general, and of such importance as to become the object of attention of all philosophers. Brugmanns had already discovered, in 1778, that bismuth is repelled by the two poles of a magnet. Becquerel, sen., again met with this repulsion, both in bismuth and in antimony. Mr. Faraday found that his great electro-magnet produced this repulsion in almost all the bodies it did not attract. He discovered at the same time, that long pieces thus repelled, assume, under the influence of the electro-magnet, a position perpendicular to that which an attracted body would take under the same circumstances. This property he called *diamagnetism*.

M. Reich of Freiburg, so well known from his beautiful experiments on the deviation in the fall of bodies from a great height, applied to the discovery of diamagnetism the observation overlooked by other philosophers, that the two poles of the magnet employed together do not produce on these bodies a repulsion equal to the sum of the repulsions produced by

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* From the *Annales de Chemie et de Physique* for December, 1848.

each of them, but equal to their difference ; so that their joint effect is null when their forces are equal. At the same time he made some experiments, which seemed to indicate that the pole which repulsed the diamagnetic body produced in the parts adjacent to it a magnetic force similar to its own, but not an opposite force, as occurs in attracted bodies. Prof. Weber† confirmed the opinion of M. Reich by some very elaborate researches, and showed that diamagnetic bodies acquire, under the influence of the electro-magnet, a transversal magnetism having two poles, but so placed that each of them has the same kind of magnetism as the pole nearest to the electro-magnet.

M. Poggendorff conceived some very decisive experiments, which have the advantage of proving the new view in an easy manner ; and M. Plücker contributed a further experiment, which, if it did not tend to establish the view, rendered the possibility of proving it more easy.

In my experiments I made use of the large U-shaped electro-magnet of the Polytechnic School of Copenhagen, which is capable of carrying 1400 kilogrammes ‡. It must, however, be remarked, that it was not necessary to put all its force in activity for these experiments : but there was rarely less than half of this power made use of, although the greater part of them might have been executed with a much weaker force, even with a single element. Each extremity of the electro-magnet supports a horizontal piece of iron, which we shall call a polar piece. These polar pieces serve to give a horizontal direction to the action of the electro-magnet. It is between the two perpendicular surfaces, which face one another, that the diamagnetic body is made to oscillate. These are called polar faces. In every case, excepting those indicated, I have made use of rectangular pieces. At the commencement of my experiments I employed cylindrical pieces ; but this form is less suited for discovering all the circumstances which should be taken into consideration in these investigations.

A diamagnetic needle suspended horizontally between the polar faces, assumes, as is well known, an *equatorial* position, which is parallel to the polar faces ; but if it is raised a little above the edges of the polar faces, it

† See Taylor's *Scientific Memoirs*, vol. v., part 19, p. 477.

‡ I have here conformed to the usual way of indicating the power of the magnet, although there is much uncertainty, as is proved by my experiments on this electro-magnet, communicated to the Society in December, 1847. The object of these experiments was to ascertain the weight the electro-magnet was capable of carrying when its poles were furnished with different pieces of iron. Within certain limits, the carrying force increased nearly in proportion to the mass of the keeper ; but what merits most attention is, that the force of the electro-magnet expressed in weight does not follow the same relation to the electro-motive power of the galvanic apparatus, when the keeper is in contact with the electro-magnet, and when it is at a certain distance. In contact, the mean effect of each galvanic element was 712.5 kilogrammes. But two elements combined gave but 0.72 of the sum of the individual effects of the elements ; three elements combined gave but 0.48 ; eight, 0.26 ; sixteen, 0.125 ; so that the effect of sixteen elements was only twice that of one. At the distance 1.33 millim., the effect of one element was only 0.178 of that of the same element in the case of contact, but the effect increased in a very different ratio with the number of the elements ; in this case sixteen elements gave four times the effect of a single one. At 2.225 millims. distance the effect of one element was only 0.051 of that produced in case of contact ; but sixteen elements gave 9.4 times the effect which a single one gave. These experiments, which require much time, I intend to continue as soon as my other engagements will allow.

takes a perpendicular direction to the prolonged polar faces. This position is at the same time axial ; but it will subsequently be seen that the question here is as to its perpendicularity to the polar faces. This phenomenon is exhibited with remarkable quickness, which renders the experiment very convenient for many diamagnetic investigations. When the needle is turned from its perpendicular position, it re-acquires it by oscillation. Its directing force diminishes with its elevation above the polar pieces. The experiment was made with several diamagnetic bodies, with bismuth, amber, mother-of-pearl, tortoise-shell, alabaster, quills of feathers, sulphur, coal, &c.

The change of direction observed in these experiments vanishes as the polar faces are separated. At the distance of seventeen millims. the effect was still well marked ; but it is very much stronger at short distances. When the distance was diminished, so that the diamagnetic body could not be inserted between the polar faces, that is to say, perpendicular to them, the part of the effect which takes place above the polar faces was exhibited with considerable energy. When the diamagnetic needle was suspended above the upper edge of one of the polar faces, it equally assumed the position called *axial*, perpendicular to that edge, but with less force than under the influence of the two faces. On examining the position which the needle takes above the other edges of the polar piece, it is found that it everywhere assumes the position perpendicular to the edge to the influence of which it is exposed. In those cases where it is exposed to the action of two edges at once, it takes the intermediary position. Above the edge of a wedge-shaped piece of iron, placed with its base on one of the poles of the electro-magnet, the needle likewise assumes a position perpendicular to this edge. On a cylindrical polar piece, the needle placed with its centre above the edge of the polar face, arranges itself perpendicular to it ; but at some distance from the edge it turns and takes a perpendicular position to the line which may be drawn parallel to the axis in the more elevated part of the cylindrical surface. When a perforated cylinder is employed as a polar piece, and the diamagnetic needle is made to descend and rise alternately, and parallel to the polar face, the needle is found to leave the position parallel to the polar faces, and to assume the position called axial, as soon as it is opposite the perforations. I employed for this experiment a needle of bismuth sixteen millims. in length. With two similar polar pieces the same effect is obtained, but it is much greater.

When the diamagnetic needle is suspended between the polar faces, it has, in accordance with the experiments of the German philosophers above-mentioned, magnetic poles in the transversal direction, arranged in such a manner that the magnetism of each side is of the same nature as that of the pole nearest to the electro-magnet. The easiest method of observing this is that described by M. Plücker, who introduces between the polar faces, and parallel to them, a small bar of iron separated from the faces by some non-magnetic substance. As the sides of this bar acquire by the influence magnetism the reverse of that of the nearest face, but each side of the needle has the same magnetism as the nearest face, the needle now retained by two forces oscillates with much greater velocity than when under the influence of the polar faces only. When the diamagnetic needle is raised above a polar piece, and its direction is changed, its magnetic poles change their places at the same time.

I had been led into error at the commencement by several phenomena, which in the novelty of the investigation seemed very complicated, but which nevertheless appeared very simple when the law had been found for them. At first I thought that the diamagnetic needle above the polar pieces had in each extremity the opposite magnetism to that of the adjoin-

ing polar piece ; for the lower part of a bar of iron, influenced by the piece, repelled the extremity of the needle which was above that piece. This effect takes place not only on placing the repelling pole of iron near to each side, but equally above and below. Nevertheless, later experiments have led me to reject the conclusion which I had previously drawn. I found that a piece of iron of moderate size receives from the polar piece acting upon it, a magnetic force sufficient to repel the diamagnetic matter of the needle, notwithstanding the poles which it had received under the influence of the electro-magnet. To discover the diamagnetic poles in this case, it is necessary to employ very small pieces or blades of iron ; they should not weigh more than two or three grammes. To experiment with them the easier, I attached slips of zinc or pieces of wood to them. By this means I at last arrived at the conviction, that the lower part of the diamagnetic needle suspended above a polar piece has the same magnetism, and that its upper portion has the opposite. In experimenting on this subject, I finally made use of a thin blade of iron, shaped thus ☾ , and fixed to a piece of wood. When this blade is placed on the polar piece, it has in its upper part the same magnetism as the polar piece, and in its lower part the opposite. When the opening of the curve faces the needle, it attracts it ; but when the upper part is beneath, or its lower part above the needle, it repels it.

When the needle is suspended over one of the polar pieces, so that the prolongation of one of the perpendicular faces of the piece divides the needle into two parts, it is found that the diamagnetic poles produced by the electro-magnet extend beyond the part which is above or correspondent to the upper surface of the piece. In some experiments made with a needle of bismuth of fifty-six millims., this effect extended to nearly fourteen millims.

When the needle was divided into two equal parts by the prolonged perpendicular faces, the extremity of the needle the more distant from the polar piece was not polarized.

When the electro-magnet was furnished with two polar pieces placed at a distance of forty-eight millims., I found that the same needle had diamagnetic poles in all its parts. The half of the needle which was turned towards the north pole had north magnetism at its lower edge, and south magnetism at its upper edge ; the other portion of the needle had, under the influence of the south pole, the magnetism of this pole at the lower edge, and north magnetism at its upper edge. There is, therefore, opposite magnetism in the two halves of each edge, taken separately, and in each half between the two edges, the upper and lower one.

When the diamagnetic body is made to oscillate between the polar faces, it does so with greater velocity the nearer it is to one of the edges of this face. In one experiment in which the electro-magnet was excited by sixteen of Bunsen's galvanic elements, and where the distance of the polar faces was six millims., a needle of bismuth at an equal distance from the upper and lower edges of these faces made twenty-five oscillations in thirty seconds ; but level with the edges, it made 100 oscillations in the same time. Above the polar pieces, in the axial position, the needle made only nineteen oscillations in the same time. These experiments have been sufficiently repeated and varied to afford the most perfect certainty as to what has been stated ; but the investigations have not yet been carried far enough to admit of an accurate numerical law being deduced from them.

When a horizontal needle of bismuth is suspended by a fibre of silk to the extremity of a balance, so that the balance can be raised or lowered, the needle is found to be repelled with so much more force the nearer it is situated to one of the edges of the polar faces. It will be understood that

this repelling power causes the needle to ascend when it is near the upper edges, and to descend when near the lower edges ; in the intermediate position it neither ascends nor descends. When the needle is suspended above the polar pieces, and consequently in the direction perpendicular to the edges of the polar faces, it is again repelled, but much more feebly than when in the equatorial position.

Hitherto diamagnetic effects had only been observed in bodies which are repelled by the two poles of the magnet. My experiments have shown that a similar effect may be produced in most bodies which are attracted by the two magnetic poles ; so that these bodies constitute a new kind of diamagnetic substances. These two classes may be distinguished by the names of *repulsive* and *attractive* diamagnetic bodies.

A needle made of a substance that is attracted by the magnet, but of which the magnetism is not of the same nature as that of iron and nickel, when suspended between the two polar faces of the electro-magnet, acquires, as is well known, the position called axial by Mr. Faraday ; but if it is raised above the upper edges, or lowered beneath the lower edges of the polar faces, it assumes the equatorial position. This property has hitherto been found in the following substances : viz., platina, palladium, iridium, titanium, an alloy of 0.825 of tin, 0.24 of bismuth, 0.108 of iron, in brass, German silver, wood-charcoal, coke (fossil coal belongs to the repulsive diamagnetic bodies), obsidian, native carbonate of iron, attractive glass, prussian blue, and solutions of iron.

In the majority of these substances, the magnetic poles which they obtain during the influence of the electro-magnet disappear nearly as soon as this influence is removed ; however, their existence is betrayed when the poles of the electro-magnet are suddenly changed, for then many of these bodies turn half round, as is the case with a magnetic needle ; others do not exactly turn, but oscillate, thus indicating their tendency to a change of position. But we find some attractive diamagnetic bodies, such as a piece of iridium in my possession, wood-charcoal and coke, which retain the poles they have acquired by the influence much longer, of which it is easy to be convinced by experiments on the mariner's compass. The experimental investigation of the phenomena exhibited by these bodies, is complicated by this duration of the polarity ; but they will probably lead us to discover the connexion which exists between magnetism and diamagnetism.

When a needle, constructed of an attractive diamagnetic substance, is suspended above the upper or beneath the lower edge of a polar piece, it assumes a position parallel to this edge. In this parallel position, which might either be perpendicular to the magnetic axis of the polar piece, or parallel to it, or have quite another position than the figure of the polar piece requires, the disposition of the magnetic forces in the needle is transversal, as in a repellent diamagnetic body ; but with this difference, that its lower part has the opposite magnetism to that of the polar piece, and the upper part that of the same nature.

I have not succeeded in causing iron to assume the diamagnetic state. An iron wire, of which the diameter is but $\frac{1}{10}$th of a millimetre, still takes the axial position just as well above the polar faces as between them, and with a force nearly sufficient to break the fibre of silk. This experiment has been varied by placing in a quill of a feather, which is repellent, a fragment of the same iron wire, merely two millims. in length ; but this arrangement still exhibited the same effects as the iron separately. The same result was also obtained on substituting for the bit of iron wire a very small particle of iron filings ; but on introducing, in the place of iron, a piece of straw which had been immersed in a solution of iron, the diamagnetic effects of attractive bodies was obtained. Nickel gives the

same results as iron. Thus nickel and iron ought properly to be called magnetic in the strict sense. This probably applies to some other substances, perhaps to cobalt.

There is consequently a decreasing magnetic progression which comprises the properly so-called magnetic substances, the attractive diamagnetic substances, and the repulsive diamagnetic substances. The magnetism of these last may be considered as negative, if the magnetism of iron and the attractive diamagnetic substances is regarded as positive.

The effect which the polar faces exert upon the attractive diamagnetic bodies is like that which takes place with the repulsive diamagnetic bodies, stronger when the body is placed nearer the upper or lower edges than their intermediate parts. A piece of attractive glass, 27 millims. in length, which was suspended between the polar faces, 29 millims. apart, in such a manner that the extremities of this needle were not more than one millim. distant from the polar faces, was made to oscillate each time during 30 seconds. At an equal distance from the upper and lower edges it made only 4.5 oscillations in the 30 seconds, but level with the polar faces it made nineteen.

When the polar faces are at this distance, the needle does not assume the equatorial position when it is suspended above their edges. At the distance of 4.5 millims., it made 5.5 oscillations ; 13.5 millims. distant, it made only 2.5 oscillations. The polar faces were approached to within three millims. The needle, which now could not assume the axial position between the faces, nevertheless showed its tendency to take that position ; but raised two millims above their edges, it assumed the equatorial position, and made eighteen oscillations in thirty seconds. At a distance of $\frac{3}{10}$ths of a millim. it made thirty-five oscillations. At the least possible distance, so as just to avoid contact with the polar pieces, it made forty-five oscillations.

It is seen that both the repulsive as well as the attractive diamagnetic bodies make more numerous oscillations in a parallel position to the polar faces than in the perpendicular position, It must however be observed, as has already been done, that the determinations of the numbers have not yet been carried sufficiently far to serve for the calculation of their laws.

I lately made some experiments on the influence which heat exercises on diamagnetic substances. These experiments are not yet numerous enough ; they however prove to me that some attractive diamagnetic substances pass into the class of repulsive diamagnetic substances by an increased temperature. The only substance which exhibits this effect in a high degree, is brass. My analogous experiments on other bodies are not yet sufficiently decisive to warrant their publication.—*Philosophical Magazine.*

IMPURITY IN SULPHATE OF MAGNESIA.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Sir,—I wish to direct the attention of Chemists to an Epsom salt now in the market, which contains an inconvenient proportion of a salt of iron combined with it. Its solution turns brown by exposure, and a portion of the iron precipitates in the form of an oxide.

It will readily occur to the dispenser, in many instances, this contamination is calculated seriously to embarrass him ; and perhaps in no instance is the presence of this salt more likely to create alarm in the mind of an ordinary observer than in making that very general domestic medicine of Epsom salt and chamomile tea, the resulting compound being nearly black. I doubt not but that " prevention" will be found " cheaper than cure."

I remain yours,

20, *New Street, March 20th.* Thomas Greenish.

ON A NEW SYSTEM OF ARTIFICIAL ILLUMINATION.

BY C. B. MANSFIELD, B.A.

Substance of a Paper read at the Institution of Civil Engineers, On Tuesday, April 17th, 1849.

The paper first noticed that liquid hydrocarbons had been comparatively little used for the production of artificial light, and that, in the instances in which they had been applied, their liquidity, and not their evaporability, had been turned to account.

In the use of the common volatile oils, the excess of carbon in their composition was the great difficulty; this, however, when properly treated, became an actual benefit.

There were two methods of rendering this carbon efficient as "light-fuel," when advantage was taken of the volatility of the substances: one was, to cause the vapour, as it escaped from a jet, to mix rapidly with the air; the other, to mix the vapour before combustion with other gaseous matters containing less carbon. The contrivance of the first of these was instanced in Holliday's recently patented Naphtha Lamp. The second was adopted in the new arrangements described in the paper.

This principle was carried into practice in two ways. The first (which was illustrated by a lamp that was burning on the table) was effected by mixing the hydrocarbons with some other inflammable spirit containing very little carbon. The mixture was described as being made in certain definite proportions, which ensured a perfectly white light, and from which any deviation would result in a flame of inferior quality,—pale, if the hydrocarbon were deficient,—smoky, if the mixture were poor in spirit. The ingredients most accessible in this country, were stated to be, wood-spirit, and a volatile oil from coal naphtha, in the proportions of two-thirds of the former to one-third of the latter. Alcohol and oil of turpentine had been similarly used on the continent, though the former was too dear for use in England.

The other adaptation of the same principle, and that which it was the chief object of the paper to describe, was the dilution of the hydrocarbon vapours with permanent gases of inferior, or even of no illuminating powers.

That application might be called the naphthalization of gas, or the gasization of naphtha, according as its main object was to enhance the services of the gas, or to utilize the liquid; the latter was the object of the new proposal described in the paper. The former had been already accomplished by preceding inventors.

The first invention was that of Mr. Donovan in 1830, who proposed to confer illuminating power on gases that were inflammable but not luminiferous, by charging them with the vapour of hydrocarbons; but from the want of a sufficiently volatile fluid, he was compelled to have a reservoir close to every burner. The next application was that of Mr. Lowe, who increased the light obtained from coal-gas by passing it over surfaces of naphtha. Mr. Beale's air light was then noticed; its object was to use hydrocarbons for illumination, by passing a current of air through vessels containing those liquids. There existed, however, the same obstacles to this plan as to that of Mr. Donovan,

viz., the heat required to evaporate the only liquid hydrocarbons then available.

The paper represented that at length the difficulty had been solved, by the discovery of a liquid hydrocarbon, as volatile as spirit of wine, but containing sufficient carbon for the most perfect light, and obtainable in any quantity. This hydrocarbon was procured from coal-tar, and was called "benzole." Its volatility was such as to enable it to naphthalize atmospheric air as effectually as ordinary naphtha did coal-gas.

The system proposed by the author (which was illustrated in the room by a working apparatus) consisted in conducting a stream of almost any gas, or even of atmospheric air, through a reservoir charged with benzole or some other equally volatile hydrocarbon; the gas or air so naphthalized being then conducted like common coal-gas through pipes to the burners. It was stated, that the system was applicable on any scale, from the dimensions of town gas works to the compass of a table lamp. In the apparatus exhibited, a small gas-holder, filled by a pair of bellows, supplied common air through pipes. The gases formed by passing steam over red-hot coke, would answer well for this purpose, and it would depend on local circumstances whether this mode of generating the current would be preferable to the expenditure of the mechanical force necessary for driving atmospheric air through the pipes. Pure oxygen charged with the vapour would explode on ignition; it was therefore suggested that this might prove a useful source of motive force. It was, however, stated to be difficult to form an explosive mixture of the vapour with common air. By decomposing water with the voltaic battery, naphthalizing the hydrogen with benzole, and burning it with the aid of the equivalently liberated oxygen, a simple light of intense power might be obtained. The system was shown to be a great simplification of the ordinary system of gas-lighting, as no retorts, refrigerators, purifiers, or meters were required, and the products of combustion were as pure as those from the finest wax. It was expected that the elegance of the material, and the simplicity of the apparatus would gain for it introduction into buildings and apartments where coal gas was not now considered admissible.

The apparatus and conditions necessary for the success of the method were, a flow of cheap gas or of air, driven through pipes by any known motive power, and a reservoir of the volatile spirit through which the main pipe must pass in some convenient part of its course; these pipes and reservoirs being protected from the cold. It was stated, that though the liquid did not require to be heated above the average temperature of the air, it was liable to become cooled by its own evaporation, so as to require an artificial supply of warmth. This was readily effected by causing a small jet of flame of the gas itself to play upon the reservoir, and by a simple contrivance, called a "Thermostat," by which the flame was shut off when necessary, the temperature could be made self-regulating, so as never to rise above or fall below a proper degree. The cooling due to the evaporation, would, of course, be inversely proportionate to the quantity of liquid in the reservoir. If atmospheric air was used as the vehicle for the vapour, the jet holes in the burner, from which it escaped for combustion, must be slightly larger than those for coal-gas. Some burners, contrived for the purpose

of accurately adjusting the size of the orifice to the quantity of luminiferous matter escaping, were exhibited and described; they were made so that by moving a part of the burner, any required quality of flame, from lightless blue to smoky, could be obtained, there being a medium point at which the most perfect brilliancy was ensured. The burners would answer equally well for coal-gas, though that material could not, even by them, be made to evolve so white and pure a light as that from benzole vapour.

In conclusion, some data were given on which a calculation of price was founded.

It was stated, that a gallon of benzole, of the degree of purity requisite for the purpose, would cost about two shillings and sixpence; to this, the expense of the air current and the interest of the original outlay on apparatus was to be added. This, the author presumed would not raise the cost to more than four shillings for the consumption of a gallon of benzole. It was stated, that one ounce of that liquid would give a light equal to four wax candles, of four to the pound, for one hour; or one gallon, for about one hundred and twenty hours. It was inferred that a gallon of this material was equivalent to about one thousand cubic feet of coal-gas.

Finally, for comparison with coal-gas at a distance from the mines, it was stated that, while to produce one thousand cubic feet of gas, at least two hundred pounds of coal must be transported, one gallon of benzole did not weigh more than seven pounds; this, in carriage, would give benzole an advantage of twenty-eight to one over coal as a source of light.

In the discussion which ensued, high encomiums were passed upon the talent and patient labour exhibited by Mr. Mansfield in the investigation of this important subject, which promised to lead to most remarkable results, as an extension of gas lighting to positions where it had not before been considered applicable.

DEATH OF THREE FEMALES OCCASIONED BY CARMAN'S STOVE.

On Saturday, April 7th, an inquest was held by Mr. G. J. Mills, the deputy coroner for Middlesex, at the Eyre Arms Tavern, St. John's Wood, on the bodies of Eliza Griffiths, aged 15, Frances Carter, aged 17, and Eliza Pritchett, aged 23, late servants at Miss Caroline Mann's establishment for young ladies, No. 2, Loudown Road. A fourth servant had narrowly escaped, and was, at the time of the inquest, too ill to attend as a witness.

The substance of the evidence was as follows: Eliza Pritchett, the cook, had been for several weeks suffering from a cough and cold, and had been home to her sister in consequence. A few days afterwards she returned, although still very unwell, and on the afternoon of Tuesday, April 3d, she was slightly delirious, and went to lie down in a small apartment usually occupied by the foot-boy. At ten o'clock in the evening, Miss Mann went to see her, and the room feeling cold and damp, she ordered the hall stove to be removed into it, and directed another of the servants to sleep there, and take charge of the invalid. Beds were made up, and the other three servants of their own accord, settled themselves for the night in the little

room, the dimensions of which were 14 feet 9 inches, by 9-feet 8 inches. The floor was not boarded, and there was no fire-place or other means of ventilation.

Early in the morning, Mrs. Anne Wilson, assistant to Miss Mann, on entering the room, found three of the servants dead, and the fourth (Hannah Pribe) in so feeble a state, that she had fallen on the floor in the endeavour to dress herself. Mr. Crellin, surgeon, of Wellington Road, was immediately called in, and resorted to the usual means for restoring suspended animation, but to no purpose. The only surviving patient had been under treatment up to the time of the inquest, and was confined to her bed. On a *post-mortem* examination of one of the deceased, the appearances indicated death from asphyxia, no other symptom of derangement being observable.

It was stated in evidence that the stove in question had been purchased for warming the hall, and Miss Mann, before using it, had made particular inquiry as to its safety, being aware that accidents had sometimes occurred from the use of improperly constructed stoves. Mr. Carman, of Newgate Street, assured her that the stove might be used without the least fear of any bad consequences, and recommended it as being a remarkably safe and economical stove, observing that he had testimonials to that effect. Mr Carman, sen., on behalf of his son, who was ill, stated at the inquest, that during two years, no less than 1,100 of the stoves had been sold, and that with proper management, they were perfectly safe, in proof of which he had several testimonials, among others, one from Mr. Galloway, of Finsbury Circus.

The fuel used in the stove is sold by the patentee under the name of Prepared Fuel. A sample produced at the inquest appeared like ordinary charcoal. A written opinion was handed to the deputy coroner, stating that the stove "must be very unsafe and prejudicial to any one inhabiting an apartment in which it might be placed. Signed W. O. Chalk, Surgeon." Cases were mentioned in which death had ensued from the use of similar stoves.

The deputy coroner having summed up the evidence, the jury, after a consultation of nearly an hour, unanimously agreed to the following verdict: "That Elizabeth Pritchett, Eliza Griffiths, and Frances Carter, were found dead in a small and ill-ventilated room, and that their deaths were caused by the poisonous fumes of burning charcoal, which had been sold at an extravagant price, under the fraudulent name of Prepared Fuel, and that these attempts to vend charcoal under the name of Prepared Fuel, to be used in Carman's or any other such portable stoves, is a scandalous imposition on the public."

No blame whatever was imputed to Miss Mann.

THE MASTER AND WARDENS OF THE APOTHECARIES' COMPANY *versus* WELLS.

This was an action in the Bloomsbury County Court, to recover the penalty of £20, under the 20th section of the 55th George III, cap. 194. A *certiorari* had been granted by Mr. Justice Patteson, on application of defendant to remove this plaint to the Queen's Bench, but an order was afterwards made, on the application of plaintiff, to quash the same unless defendant gave security for costs, which he declined doing. Accordingly the cause was tried in the County Court (Berners' Street) on the 19th of April.

The charge in the plaint was, that the defendant "did act and practice as an Apothecary, to wit, at Grove Street, Camden Town, in the county

of Middlesex, by then and there acting as such Apothecary, attending, and advising, and furnishing, and supplying medicines to and for the use of certain persons (to wit) one Jane Reeks, since deceased, and Jane Reeks, the mother," &c., without having obtained such certificate, &c. &c.

Mr. Griffits* appeared as counsel for the plaintiffs, and Mr. W. V. Eyre as their solicitor; counsel for the defendant, Mr. Corrie; solicitor Mr. Frederick Asprey, No. 6, Furnival's Inn.

Before opening the case Mr. Griffits requested the Judge to order the witnesses out of Court, which request his honour complied with. He commenced his address by an allusion to the origin of the Worshipful Society of Apothecaries, a body which had existed about two centuries and a half, having been originally separated from the grocers, and having rendered essential service to the public by the improvements they had introduced in the science of medicine, more especially of late years. Having adverted to the responsible duties of the Apothecary, and the Act of 1815 (55 Geo. III) he appealed to the jury to assist in protecting the public against the calamitous effects of ignorance in persons illegally assuming the office of an Apothecary: it was the bounden duty of the Worshipful Company which he had the honour to represent, to come forward in cases like the present—they had no alternative—they were bound by the Act of Parliament (of 1815) to exercise the powers entrusted to them for the suppression of practice by unqualified persons. The present case was only the first of this description which had been tried. The question at issue in previous cases had related chiefly to the distinction between medical and surgical practice, and persons who could legally practise as Surgeons, had been prosecuted for acting as Apothecaries, in proof of which it was necessary to demonstrate that the disorder treated was a medical and not a surgical one, and that defendant had attended and administered, or furnished, the remedies. In the present case defendant was a Chemist, and it would be proved, by incontestable evidence, that he had acted as an Apothecary in a case of consumption, which was undoubtedly a medical case—that he had attended the patient, and furnished the medicines. It would be proved that he had repeatedly visited the patient, and although it was possible that an attempt might be made to weaken this testimony by a counter statement, yet this would not affect the general issue, since the act of compounding the prescriptions, which was not denied, rendered the defendant equally liable to the penalty under the Act.

Now, as to the duties of an Apothecary, it was stated in the 5th section of the Act above cited, that it is the duty of an Apothecary "to prepare with exactness, and to dispense such medicines as may be directed for the sick by any Physician lawfully licensed," &c.; the same clause further enacted that any Apothecary refusing so to dispense, or falsely or unfaithfully dispensing such medicines, should be liable to a penalty of £5 or £10. Consequently it was obvious that any person not being duly qualified to act as an Apothecary, who should presume to dispense prescriptions, was liable to the penalties imposed by the Act. Now it was further provided by the said Act that, for the security of the public, the Master and Wardens of the said Company of Apothecaries should have the power of visiting Apothecaries' shops, examining the medicines, and destroying such as might be found unfit for use. This would explain the cause of the prejudice in favour of Chemists and cheap physic, for these persons not being subject to such supervision or controul, and not being obliged to undergo any education, could sell medicines of any quality, and could of course supply trash at a much lower price than the Apothecary charged for the genuine articles which the law obliged him to dispense.

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* In our last number the name was spelt *Griffiths* by mistake.

The learned counsel concluded the introductory portion of his eloquent and imposing address by assuring the jury that, under any circumstances, the plaintiff was entitled to a verdict, whether the whole charge was proved or not, *the dispensing of prescriptions being as much a violation of the law as visiting patients.*

In applying these remarks to the facts of the case, he commenced by describing the defendant as an uneducated person, who had not been apprenticed, and was in every respect unqualified.

Mrs. Harris, examined.—Witness saw Jane Reeks, who was taken ill on the 10th November. Defendant called and prescribed for her. He called several times, felt her pulse, looked at her tongue, &c. Did not hear him say what the complaint was. Heard him order the windows to be shut, and a fire to be lighted. Was surprised at these orders, as Mr. Collins had ordered free admission of air for my children who were ill at the same time. Went to defendant's shop with Mrs. Reeks, who brought away some medicine—did not see it prepared. Defendant did not attend the child after the 13th. Mr. Godwin was attending at the time the child died.

Cross-examined.—Saw defendant three or four times attending the patient. He always came alone. Mr. Collins attends my family. He has a shop, like a Chemist's shop, a few doors from defendant. He lives in Park Street; his brother is at the shop in High Street.

Henry B. Collins (in answer to Mr. Corrie).—I am not the informer. (Examination in chief). I am assistant to my brother, who is a Surgeon. He lives in Park Street; I reside at the surgery in High Street. I know defendant—can identify his hand-writing. Part of that certificate (of the death of Jane Reeks) is his hand-writing, the signature is by Mr. Godwin. These bills are in Mr. Wells's hand-writing: "Medicines, &c. 12*s.* 6*d.*" "Bill delivered, 11*s.* 6*d.*" "Medicine for Child, 7*s.* 6*d.*"

Cross-examined.—My brother does not keep a shop; but a surgery. It is not like defendant's shop. We do not expose articles for sale. The words "Prescriptions faithfully prepared" are not in the window; cannot swear that the words "Chemist and Druggist" are not over the shop; believe the words in the window are "Prescriptions carefully prepared." I have dispensed prescriptions some four or five years ago. Will not swear that I have not dispensed prescriptions within the last four months. I am not an Apothecary. My brother is not an Apothecary; I have dispensed medicine ordered by him.

Mr. O'Reilly.—I am not the informer.—I am a Surgeon. I passed the shop of the defendant on the 10th of March, and called with Mr. Eyre, the solicitor for the plaintiffs, to caution the defendant about practising. He was dispensing medicine, which I told him was illegal. Defendant denied having practised as an Apothecary.

Mr. Corrie, on behalf of the defendant, in a very able address explained the state of the law in reference to the practice of an Apothecary. He did not think it requisite to dive into the remote periods of history, but adverted to the origin of the Act of 1815. The proceedings which led to this Act commenced about the year 1813, when a bill was brought in for regulating the practice of Apothecaries. The Chemists, fearing lest some provisions might be introduced interfering with their business, formed themselves into a committee to protect themselves, and insisted on the insertion of a clause exempting them from the operation of the Act. In consequence of this opposition, a clause was prepared, and the following extract of a letter from the solicitor of the Apothecaries to the Chairman of the Chemists' Committee would serve to show that there was no intention of interfering with Chemists:

"Sir,—We are instructed by the Committee of the Society of Apothecaries to forward to you the clause which they propose at the requisition

of the Committee of your body, to introduce into the Act now before the House of Commons, and which, we trust, will meet the wishes of the parties whom you represent.

"The Committee of the Society of Apothecaries see with concern that misrepresentations have been made of their object, which is the improvement of their branch of the profession in medical knowledge. To this their views are so entirely directed that they have no disposition to insist on any clause which is not essentially connected with it."

The clause, with some little alteration, was agreed to, and is the 28th clause of the Act, reserving to Chemists all the rights and privileges they enjoyed before the passing of the Act. To suppose that the Act was intended to interfere with the right of Chemists to dispense prescriptions was a notion too monstrous to be entertained for a moment. In looking over the report of the proceedings in 1815 (in the *Historical Sketch of the Progress of Pharmacy*, by Mr. Jacob Bell), the names of many of the Committee were names known at the present time as Chemists and Druggists; in fact, the business had been handed down from father to son, and continued without interruption: and could it be supposed that all these parties and hundreds in the metropolis, and indeed all over the country, were to shut up their shops? If this were the intention of the Act, what has the Worshipful Society of Apothecaries been doing since the year 1815? It was clear that the said Society could not be cognizant of these proceedings, which, in fact, were undertaken by a new body lately started under the name of the "Medical Protection Society," and the object of these proceedings was obvious. The dispensing of prescriptions being a lucrative branch of the business, and the charges of Apothecaries very high, they naturally desired to engross all this profit to themselves, instead of allowing the public to obtain medicine at a reasonable rate from Chemists, who as a body were better qualified to dispense prescriptions than most Apothecaries.

The learned Counsel denounced as unjust and untrue the sweeping charge against the defendant of ignorance and incompetence with which the Counsel on the other side had commenced his case, and stated that he was prepared to prove that Mr. Wells had served a regular apprenticeship, and had also served for several years as assistant to Mr. Collins.

In reference to the case before the Court he should prove that defendant did not visit the patient, that he merely dispensed the prescriptions in the capacity of a Chemist, which he had a perfect right to do, the said prescriptions having been written by a qualified Practitioner, who had attended the case. He would prove by the evidence of respectable Chemists who were in business before 1815, what was the custom of the trade at that time, and thus place beyond all doubt the fact that the claim set up by his learned friend was monstrous and unjust, and that his client was on every ground fully entitled to a verdict.

John Knaggs, examined.—I am a Surgeon and Apothecary. I know the defendant—have frequently recommended patients to his shop—have also attended patients sent by him to me, and he has prepared the prescriptions. I attended Jane Reeks for diarrhœa, she was sent to me by defendant—she recovered. I was apprenticed before 1815. Chemists at that time were in the habit of preparing prescriptions—they sometimes gave advice across the counter.

Cross-examined.—I am fifty-seven years of age. I was apprenticed in Lancashire to Mr. Mounsey. He practised as an Apothecary before the Act—afterwards he merely acted as a Chemist. I consider the distinction between an Apothecary and a Chemist to be, that an Apothecary goes out to visit patients, a Chemist dispenses medicines at home. I became a

licentiate of Apothecaries' Hall some years afterwards. It is necessary in passing the Hall to produce indentures of apprenticeship with an Apothecary.

Mr. Griffits.—And you passed off your indentures at the Hall when you say that your master was only a Chemist! You are liable to a prosecution—your licence is not worth a rush—this is disgraceful. *Witness.*—Mr. Mounsey practised as an Apothecary before the Act.

Sarah Muffit.—In November last I was landlady at 6, King Street. Mrs. Reeks was my lodger. About the 6th of November my children were ill. Mr. Godwin attended. Mrs. Reeks had a child ill. I advised her to consult Mr. Godwin, and he attended several times. Mr. Wells never came to the house but once, and then he came with Mr. Godwin to look at my child's eye—he did not prescribe, but advised me to consult an oculist. I always saw Mr. Godwin when he came. He attended until the death of the child.

Cross-examined.—I went to Mr. Wells's shop to see Mr. Godwin. I waited for the medicine to be prepared. I was there yesterday with Mrs. Reeks, Mrs. Leech, Mr. Godwin, and Mr. Wells's attorney: Mr. Wells was there part of the time.

Mr. A. Garden.—I am a Chemist, residing in Oxford Street, sixty years of age. I was apprenticed about the year 1810. I remember the passing of the Act in 1815. I am not an Apothecary—never attended patients. Chemists before 1815 dispensed prescriptions, and occasionally gave a little advice over the counter in trifling cases. I was never very fond of giving advice. I am an operative and dispensing Chemist.

William Howse, Chemist, Titchbourne Street.—Was born in 1794. Recollect the passing of the Act in 1815. It was universally the practice at that time for Chemists to dispense prescriptions, and occasionally to give advice. The regular business was dispensing. They did not visit patients as medical men. I understand the distinction between a Chemist and an Apothecary to be, that a Chemist prepares and dispenses medicines, an Apothecary visits the sick, studies disease, and administers remedies for such disease.

Louisa Leech.—Saw Mr. Godwin attend the child several times.

Margaret Reeks.—Mr. Godwin attended the child. I took the prescriptions to Mr. Wells to be made up. Mr. Knaggs attended before, and I took his prescriptions to Mr. Wells. Mr. Godwin was recommended by Mrs. Muffit when my child was ill in November. Mr. Godwin wrote prescriptions. I never paid him anything. I paid Mr. Wells 1*s.* on account. I remember meeting Mrs. Harris, and she treated me to some gin. She asked me for Mr. Wells's bills. I gave one to her then and the other in the evening. Knew Mr. Collins through Mrs. Harris. When I gave up the bill I was so intoxicated that I did not know what I was doing. Mr. Godwin attended me always. Mr. Wells did not tell me to light a fire and shut the window.

Cross-examined.—Mr. Wells never called but once. The medicine was sent. I consulted Mr. Wells once, and he said he would have nothing to do with the case, but sent me to Mr. Knaggs. The bill is for Mr. Godwin's attendance and the medicine. We had several glasses of gin that day. My husband said he wished I would break off from the gang that I was mixed up with.

Mr. Corrie.—What gang? The Apothecaries' Company?

Witness.—No, not them.

James Young Godwin (Surgeon and Apothecary).—I reside in Mr. Wells's house. I was not residing there in November last. I attended Mrs. Muffit's child, and afterwards Jane Reeks. These are my prescriptions.

I also wrote other prescriptions for the patients. The price charged in the bill is a very moderate charge, not more than a Chemist would charge for the medicine. I signed the certificate of the death ; Mr. Wells put in the name and age.

Cross-examined.—I first attended the child about the 10th of November. I attended Mrs. Reeks subsequently. I first became acquainted with Mr. Wells by going to have prescriptions made up. I have seen Mrs. Reeks at his shop, and prescribed for her. I read over the evidence to the witnesses. I obtained it from Mr. Asprey.

Mr. Griffits in his reply laid much stress on some discrepancy which had occurred on cross-examination between the testimony of the witnesses for the defence, chiefly in reference to a consultation which had taken place before the trial, and argued from this circumstance that their evidence was not to be relied on. He maintained that the testimony of Mrs. Harris fully proved the attendance of defendant as an Apothecary, and *that whether he had attended or not, he was equally liable to the penalty for preparing the prescriptions, arguing that although Chemists dispensed prescriptions before* 1815, *they did so by usurpation, and not by right.*

Mr. Serjeant Heath summed up at some length, and while he admitted some incongruity to exist in the testimony, he left the jury to determine whether or not this would affect the general issue. He directed the jury to confine their attention to the question of attendance as an Apothecary ; the other question, namely, the right of Chemists to dispense prescriptions, being too serious a matter for that court to adjudicate upon, especially as the Act of Parliament had been in force so many years without any interference of this kind on the previous rights of Chemists. He observed that a single act did not of necessity imply the adoption of a business or calling ; as for instance, in regard to the bankruptcy laws, where it was necessary to prove that the party was in trade, the fact that he had sold one horse, or even half-a-dozen horses, did not constitute him a horse-dealer. It must be proved that he sold horses habitually as a matter of business. The same principle applied more or less to this case. A Chemist might casually administer a dose of medicine to a patient for a sore throat, or other incidental ailment, without being liable to the charge of practising as an Apothecary ; but if he made a practice of attending patients, he would clearly come within the provisions of the Act.

The jury immediately returned a verdict for the defendant. On a question arising as to costs, the jury interposed, giving their opinion, that it was a case in which the defendant was fully entitled to his costs.

The trial occupied from about half-past ten a. m. till seven p. m.

A short report of the case appeared in the *Daily News*, which led to the following comment :—

THE APOTHECARIES' COMPANY *v.* WELLS.

To the Editor of the Daily News.

Sir,—The report of this case in your paper of to-day is correct, so far as the evidence is concerned, but not so as to the effect of it. Our counsel, Mr. J. O. Griffiths, did certainly contend that a part of the practice of an Apothecary was the dispensing of Physicians' prescriptions, and that no other persons but Apothecaries could legally do so, and cited several authorities ; but the learned Judge, in summing up, said "That although that was a question of considerable importance, it was not necessary to decide it in this case, the plaint charging the defendant with attending, advising, and administering medicines, and not dispensing them"—and the only question he left to the Jury was, whether the defendant had so attended, advised, and administered medicines ; and it was upon that the Jury found

their verdict, both the learned Judge and the Jury* at the same time saying, it was a very proper case for investigation. I am sure you will see the importance of this correction, for the impression that seems to be conveyed by your report is, that the case decides that Chemists might lawfully dispense prescriptions, which is not the fact. There is not the slightest blame to be attached to your reporter. The Court was densely crowded, and the case lasted upwards of eight hours, and I fear that he found very inadequate accommodation.—I am, &c.,

April 20. WM. EYRE, Plaintiff's Solicitor.

* What the jury said was, that it was a very proper case for the defendant to have his costs.—*Ed. Ph. J.*

REVIEWS.

ELEMENTS OF CHEMISTRY, THEORETICAL AND PRACTICAL. By SIR ROBERT KANE, M.D., M.R.I.A. Second Edition. Dublin: Hodges and Smith.

THE first edition of Dr. Kane's *Elements of Chemistry* was published in 1842, and it speedily acquired considerable reputation for the clear manner in which the principles of the science were explained, so as to bring the most important and essential doctrines of Chemistry within the easy comprehension of the student. The work has now reached a second edition, and so many new facts have resulted from the labours of Chemists in this country and abroad, in the interval, that many additions and some alterations, would obviously be necessary. The author states that, "The subject of every chapter has been carefully reconsidered, and in many cases, the matter almost entirely newly written; so that the results of the numerous valuable researches in organic and inorganic Chemistry, and in chemical physics, which have been added to science within the last few years, will be found introduced in their proper places, with as much detail as was due to their respective importance, or was consistent with the nature and objects of an elementary work."

In the department of Organic Chemistry the number of new compounds which have been recently discovered is so great, that to describe them all would necessarily swell this part of the work to an inconvenient extent. There seems, indeed, no limit to the new combinations of this class, which may be obtained by means now generally familiar to Chemists; and it becomes a question of some little difficulty to determine how many, and which, of the organic bodies hitherto described should be introduced into a work such as that before us. As the number of these bodies has from year to year been increasing, Chemists have become more and more sensible of the insufficiency of the theories and arrangements hitherto adopted for grouping together and classifying them. New theories have been proposed, entailing alterations of nomenclature, and while it is felt that neither the new nor the old theories are sufficiently comprehensive or well-established to command general assent, the greatest possible confusion is arising from their partial adoption. Thus, some works on Organic Chemistry which have recently been published on the continent, are almost wholly unintelligible, excepting to Chemists of a particular school.

It has, therefore, become a point of some interest and importance to ascertain with reference to any new publications on this subject, what

theories, arrangements, and nomenclature, are adopted. There are some writers who appear to think that their productions will be accounted scientific and learned in proportion as they are difficult of comprehension. Old and well-known names must give way to such as accord with new and doubtful theories, and even weights and measures are frequently expressed, by English writers, in relation to foreign standards, which are unused by, and unknown to, the majority of English Chemists. We were curious to learn what course had been pursued by Sir Robert Kane, with reference to these points, in preparing the new edition of his book, and we are gratified to find that he uses names that are generally intelligible, in preference to those suggested by the fashionable theories of the day; that his weights, measures, thermometrical scales, &c., are those commonly used in this country, and that his arrangement of organic bodies is founded upon the natural relations of the substances grouped together, in reference to origin, physical characters, or properties, rather than upon any fancied resemblances in constitution, with reference to which no certain knowledge can be attained. It must not be supposed, however, that the views and theories which have led other Chemists to the adoption of different arrangements, have been passed unnoticed by Dr. Kane; his explanations and remarks with regard to some of these are exceedingly good. Much care has evidently been bestowed upon those parts of the work which required alteration; much new matter has been introduced; and yet the size of the volume is not increased. We have no doubt that this edition will fully sustain the character which the work had previously acquired.

Experimental Researches in Electricity. (Twenty-second Series.) By Michael Faraday, Esq., D.C.L., F.R.S. From the *Philosophical Transactions* for 1849.

These papers contain Professor Faraday's most recent communications to the Royal Society, *on the crystalline polarity of bismuth and other bodies, and on its relation to the magnetic form of force.* They form part of a long series of papers, all of which have been read before the Royal Society, on a subject which owes its development, in a great measure, to the investigations and brilliant discoveries of the author. We have already given, at page 440 of the present volume of this Journal, a brief outline of the results obtained by Dr. Faraday in these, his last, researches.

A Practical Treatise on Morbus Coxarius, or Hip-joint Disease, *showing the Advantages to be derived from a Mechanical System of Management, &c.*, with Cases and Illustrations. By William C. Hugman, M.R.C.S., &c. London: Samuel Highley, Fleet Street. 8vo, pp. 81.

The Pathology and Treatment of the Deafness attendant upon Old Age. Illustrated by Dissertations and Cases. By Joseph Toynbee, F.R.S., F.R.C.S., &c., &c. 8vo, pp. 12.

We have received the New Orleans *Weekly Delta*, of March 26th; also the *Daily Picaynne*, of New Orleans, Vol. xiii., No. 17. The *American Journal and Library of Dental Science*, and the *Medical Examiner and Record of Medical Science*, Philadelphia, come to hand regularly.

TO CORRESPONDENTS.

Mr. Maggs (Kelvedon).—In quoting the formula for VOLATILE ESSENCE FOR SMELLING BOTTLES, we calculated the quantities for ℥xvj. Mr. Maggs having pointed out an error, we repeat the formula *verbatim* from the original:—Take ammoniated alcohol three pints (℥xvj to oj), English oil of lavender, essence of bergamot and lemon, of each half an ounce, cloves (not oil of cloves) two drachms, camphor two ounces. Macerate a week and strain.

£ s. d. (Newcastle-on-Tyne).—Probably the article on Collodion, in this number, by Mr. Edwards, will explain the difficulty alluded to.

H. (Bury).—Finings for beer are prepared with common isinglass "cut" (or partially dissolved) in sour beer. We are not aware that any substitute is better.

A Correspondent (Hereford), should write to the Secretary of the Society in question.

Henricus (Southampton).—RED SEALING WAX: Shellac, lb. ij; Venice turpentine, lb.j; vermilion, lb.iss.—BLACK SEALING WAX: the same as the foregoing, with the substitution of lamp-black for vermilion.

Leicester.—The sulphate of lime, obtained as described, may be used for manure, but cannot be made into plaster of Paris.

E. C. (Brighton) may inform his stationer that the work alluded to is not out of print.

Mr. Gallard.—The subject will most likely be alluded to in the Annual Report, in which case it would be a subject for discussion at the meeting.

Mr. Lobo.—The tyrannical nature of the proceedings is admitted without the necessity of further argument. The state of the law is another question, and as the letter has been published and extensively circulated, we think it needless to repeat it.

Tyro.—(1.) The negative plates in Smee's battery are platinized *silver*, which is immersed in dilute sulphuric acid. Similar plates could not be used in Grove's battery, as the negative plates are there immersed in nitric acid, which would attack the silver.—(2.) In the Maynooth battery the outer cells are made of cast-iron, into which strong nitric acid is put.—(3.) From 20*s.* to 30*s.*

Quæsitor.—(1.) Lindley's *Introduction to Botany*, new edition.—(2.) It has not been determined. When pure liq. potassæ is added to liq. calcis, hydrate of lime is precipitated.

Corium.—We think the cause is very likely such as our correspondent suggests, but we cannot recommend any method of determining the point.

Medicus.—Valerianate of iron is insoluble, or nearly so, in water, but perfectly soluble in spirit. If our correspondent has been supplied with a salt, purporting to be valerianate of iron, which is soluble in water, he has been imposed upon.

We have received the communications from Mr. Orpwood and Mr. Webb, also two articles "On Taking the Impression of Leaves," which we defer for want of space.

Advertisements to Mr. CHURCHILL, Princes Street, Soho.

Instructions from Members and Associates, respecting the transmission of the Journal, to Mr. SMITH, 17, Bloomsbury Square, before the 20th of the month.

Other Communications to the EDITOR, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

THE PHARMACEUTICAL JOURNAL.

VOL. VIII.—No. XII.—JUNE 1st, 1849.

DIAGNOSIS OF THE MEDICAL REFORM QUESTION.

On the 4th of May, the Lord Advocate, in reply to a question from a Member of the House of Commons, stated that a Bill, with reference to the registration of duly qualified Practitioners in Medicine and Surgery, was in preparation, and he hoped to be able to lay it upon the table of the House in eight or ten days. At the time we are writing, the Bill is ten days "overdue," and has not yet appeared.

This is not surprising, as almost every day brings forth some fresh difficulty in the arrangement, or presents some old grievance under a new aspect.

The Lord Advocate has, as we are informed, wisely determined that he will not bring in a Bill until he can calculate upon the approval of the existing medical bodies. It would indeed be a hopeless task to attempt to carry a measure in the face of a direct opposition from the College of Physicians, the College of Surgeons, or the representatives of the General Practitioners. In order to arrive at the desirable unanimity, certain points must be settled, which may be briefly described as so many suits between the parties concerned. We shall only advert to those which are most important. First,

THE COLLEGE OF PHYSICIANS *versus* THE UNIVERSITY OF LONDON.

The College claims the right of examining all candidates for the licence or fellowship. The graduates of the University of London consider this a degradation, as they contend that their examination is much more stringent and effectual than that of the College. Nothing could be more indiscreet and unfortunate than the existence of jealousy between these two bodies. Their functions are entirely distinct, while their interests are one and the same. Yet instead of co-operating in the endeavour to promote uniformity of medical education, and to raise the character of that branch of the profession, they have become entangled in questions of etiquette and supremacy, which have retarded the object that both parties have in view. We trust these differences are in course of arrangement, and that we shall see the University of London placed on a par with the Universities of Oxford and Cambridge, the College of Physicians maintaining its own position as the head of the medical department in the profession.

THE SCOTCH UNIVERSITIES *versus* APOTHECARIES' HALL.

It is an old grievance with the Scotch graduates that they are not allowed to practise Pharmacy in England without obtaining the licence from Apothecaries' Hall; and we are informed that the Scotch Universities look forward to the privilege of "making Apothecaries" as one of the advantages to be derived from the new Bill. The Universities of Oxford and Cambridge have not sought this privilege; but different notions prevail on the other side of the Tweed, and this has been a bone of contention with the Society of Apothecaries.

THE FELLOWS OF THE COLLEGE OF SURGEONS *versus* THE MEMBERS.

It would be foreign to our purpose to discuss the merits of this controversy, but we mention it as one of the sources of perplexity and delay.

THE EDITOR OF THE LANCET *versus* THE INSTITUTE.

The National Institute of General Practitioners was founded as a representative body to watch over the interests of that class of the profession. In this capacity the Council of the Institute have been received by the two Colleges and the Society of Apothecaries into joint conference, the result of which is an agreement on certain "principles" as the basis of the proposed measure. Here was a prospect at least of a favourable result; but what says the *Lancet?*

"Really these gentlemen of the 'Council,' as they call themselves, have no more pretensions to the word 'national' than the national baths, national emporiums, national halls, which abound in the Metropolis, or the establishments of Hyam and Moses. * * * The Council is now literally the Institute; for we do not believe that it numbers as many simple Members as there are Councillors. * * * How absurd then for the mere *torso* of a body, *sans* head, *sans* tail, to talk of National! Why should the Members of the Council of the present fragment of a fragmentary body make themselves ridiculous, by assuming airs and graces which do not belong to them?"*

THE GENERAL PRACTITIONERS of Manchester, Gloucester, Wolverhampton, and other Places *versus* THE "PRINCIPLES."

The "principles" in question comprise the proposal to form a new College of General Practitioners, the functions and constitution of which have been the subject of controversy for several years. Certain concessions had at length been agreed upon by the joint conference above alluded to, and these concessions are embodied in the said "principles." This has led to numerous meetings in the provinces, at which resolutions have been passed expressive of

* *Lancet*, April 14th.

much dissatisfaction, and a determination to resist the proposed arrangement.

THE COUNCIL OF THE COLLEGE OF SURGEONS *versus* THE PROPOSED NEW COLLEGE OF GENERAL PRACTITIONERS.

It was the aim and object of the original promoters of the new College to shake off the yoke of the Physicians and Surgeons, and rise supreme and independent, combining in one institution the full dignity of both branches of the profession, with the privileges and emoluments of the trade. The College of Surgeons, although opposed to the establishment of this new College, had entered into a compromise upon the understanding that the fountain head of Surgery should continue as before at Lincoln's Inn Fields, the old corporation being left in the full enjoyment of its existing rights and privileges. To carry out this condition and at the same time to meet the wishes of the rising aspirants to corporate honours, was a difficult problem, and a warm controversy has arisen on the question whether the proposed body should comprise Surgery in their curriculum and examination. We again quote the *Lancet* :†

"The Council of the College of Surgeons have now, after a full discussion of the matter, definitively refused to allow the inferior College to examine in Surgery.* * * After this the absurd 'principles' must tumble to the ground. The Institute cannot now pretend to offer an equal College to their dupes. Shorn of Surgery, nothing but a new Apothecaries' Hall, a mere Jalapian College, is attainable."

"It remains for a short time, and for a short time only, for the General Practitioners to show, by their acts, whether the unreformed College in Lincoln's Inn Fields shall rule over them as it is proposed." "Better they had never emerged from their old rank as Apothecaries — mere hangers on of the Physicians—than have now to sink back as dependants upon the College of Surgeons. The lion were better than the wolf."‡

So says the fox.

THE £500 FIGHTING FUND *versus* THE FORTHCOMING BILL.

It is rather a singular circumstance that while the Lord Advocate is preparing to bring in a Bill as the result of a protracted and patient Parliamentary investigation, one of his coadjutors is collecting a fund of £500 for the express purpose of fighting the "principles" of the Bill in the Committee of the House.

THE MEDICAL BREAD-AND-CHEESE SOCIETY *versus* PHYSICIANS, SURGEONS, AND CHEMISTS.

While these exciting altercations and negociations are in progress among the advocates of a measure, the object of which is to bring the profession into a state of harmony, security, and equi-

† *Lancet*, May 12th. ‡ *Lancet*, May 19th.

librium, the Medical Bread-and-Cheese Society are doing what little they can to frustrate this object by "throwing vinegar into the porridge."

THE MEDICAL PROFESSION *versus* THE QUACKS.

This part of the contest appears to be forgotten in the general scuffle of the Members of the profession among themselves.

The above being the leading symptoms of the disorder which Medical Reform is designed to cure, we say it is not surprising that the Bill of the Lord Advocate is overdue, nor would it be very surprising if it were to be dishonoured when presented to the House. Strong must be the nerve and indomitable the perseverance of the man who, under existing circumstances, can face the question, and great will be the credit due to him if he should succeed in his praiseworthy endeavours.

The position of the Lord Advocate in bringing in his Bill is like that of the rope-dancer at Vauxhall, who makes his perilous descent on the tight rope amidst a volley of fire-works. There is, however, this distinction between the two cases:—the rockets at Vauxhall are fired in the air and do no mischief. The squibs and crackers which surround the Lord Advocate in the House are aimed at the Bill which he holds in his hand. It is impossible to avoid a collision—it will be difficult to escape a somerset.

What then can be done? How can the catastrophe be avoided? The answer is simple. A patient is in a state of nervous excitement; all the usual remedies and plans of treatment have failed, his case is desperate, and the doctors are at fault. Homœopathy is tried as a last resource—a globule is placed upon his tongue—art having failed, the case is left to nature. The remedy can do no harm, and the mystic charm of the imperceptible dose may quiet his mind and compose his nerves.

The same experiment may be tried in the case of Medical Reform. The profession is in a state of feverish excitement: it rejects every bolus which is prepared for it. The most able legislators have tried in vain to compound a dose which will remain on its stomach: the faculty is at fault: let homœopathy be tried. In the present state of the constitution a sweeping and complete measure of Medical Reform is altogether inadmissible. A homœopathic dose might go down and compose the nerves of the excited patient; and when the present intractable symptoms have abated, a more active remedy may be tried with some prospect of success.

In this view of the case, we are supported by the Editor of the *Medical Gazette*, who observes,

"Medical Reform is, we think, likely to subside during the present session of Parliament into Medical Registration. As to the former, it is one of those shadowless entities which it is impossible to grasp. There

are at present so many conflicting propositions on the subject of reform, that our legislators have in this fact alone a good plea for postponing the consideration of the subject, until medical reformers unite upon a common ground."*

Sir James Graham's first Medical Bill was the most rational and the least objectionable that has been brought forward. The only fault which could be found in it was that it did not go far enough—it was too homœopathic. It was little more than an improved system of registration, limiting its provisions to *education* and a *boundary line* between qualified and unqualified persons. This is, we think, as much as the profession can swallow at present; any measure which pretends to go further will disturb the equilibrium, and protract the dispute between "the belly and the members." The profession must be contented with a sedative for the present; we hope the time will arrive when its constitution will be able to bear a purge.

PROGNOSIS OF THE PHARMACEUTICAL REFORM QUESTION.

Those who consider that the two questions, Medical and Pharmaceutical Reform, are as closely allied as the Siamese twins, and that the latter cannot advance a step until the former leads the way, will understand the interest and anxiety with which we observe and note down the symptoms which, according to this hypothesis, must form the groundwork of our prognosis. Although we cannot entirely assent to the Siamese theory, we recognise the close connexion of the two branches of the subject, so far as to admit that a favourable crisis in the one case may be taken as the forerunner of a similar result in the other. But when we reflect upon the ominous and perplexing collision of sentiment in reference to the Medical Bill, we cannot rest satisfied in the hope that all these difficulties will vanish, without calculating the chances on both sides.

It cannot be supposed that the legislators who have laboured for years in the cause of medical reform are actuated by any other motive than the desire to perform a public duty. The object of the Medical Bill is to protect the public, by regulating the qualifications of those to whom is entrusted the responsible duty of prescribing remedies for the sick. To effect this object, and then to leave the dispensing and preparation of these remedies in the hands of uneducated persons, would be an inconsistency too flagrant to be entertained. We, therefore, assume as a proposition, demanding no further proof, that if the Medical Bill should pass, a Pharmaceutical Bill will either accompany it or immediately follow in its wake.

But in the event of an opposite result in regard to the forth-

* *Medical Gazette* of May 18th.

coming measure, a casualty for which we must be prepared, we naturally inquire, How will this influence the Pharmaceutical question? and what steps should be adopted by our body to escape a similar catastrophe?

It is our firm conviction, that under any circumstances, whatever may be the fate of the Medical Bill, it is imperative upon the Chemists to persevere. The several branches of the Medical Profession are in advance of the Chemists in regard to legislation. What the Medical Bodies require is a general Act of Parliament to amend and amalgamate the several Acts already in force. The Chemists have never been regulated by Act of Parliament; they have only a charter of recent date, and very limited in its operation.

The difficulties which surround the Medical question do not exist in the other case. There is no complexity in the Bill required by the Chemists. There is no collision of incompatible interests. The measure is not calculated to interfere with any branch of the Medical Profession, nor would it impose any obstacle on free trade. It may be defined in a few words: A Bill to regulate the Qualification of Chemists and Druggists, and to establish a Boundary Line between Qualified and Unqualified Persons. If any proof of the necessity of such a Bill for the protection of the public were required, we need only refer to an article on Spurious Chemicals in another part of this number, and to numerous articles in previous numbers on the adulteration of drugs. That these frauds are a serious public evil cannot be denied, and we may ask—How can the public be protected against the consequences of such practices? The only remedy we can suggest is EDUCATION. By raising the qualification of those who deal in drugs and chemicals, the means of detecting fraud will be placed within the reach of all. So long as the only qualification required in a Chemist is a coloured bottle in his window, the public will be exposed to the danger of fraud and ignorance, and the skill of the Physician must be frequently frustrated by the impurity of the medicines, or inaccuracy in their preparation.

The regular Chemist is no less interested than the public in the protection which such a Bill would afford against the inroads of uneducated persons, who delude the public by their show bottles, and whose ignorance affords a ready market for spurious medicines.

On taking a review of all the circumstances of the case, we are inclined to prognosticate favourably respecting the Pharmaceutical Bill. We are not sanguine in the expectation that it will be passed during the present session; but feel confident that, if the Members of our body persevere, as we trust they will, in demanding their rights, the stigma which now rests upon them will at no distant period be removed, by the establishment of a boundary line between qualified Chemists and uneducated pretenders.

THE PROSTITUTION OF THE APOTHECARIES' ACT TO VINDICTIVE PURPOSES,

is an abuse which the Society of Apothecaries should carefully guard against. For this purpose the most strict inquiry should be made respecting the circumstances of every case which is brought before their notice, the relative positions of the accuser and the accused, and the manner in which the evidence has been got up. Nothing is more calculated to bring the Society into disrepute, and to reflect odium, if not ridicule, on the Act itself, than the indiscretion of allowing the powers conferred by the legislature for the public benefit to become subservient to private pique or personal malice.

By way of illustration: a dispute arises between M. and N. respecting some money. M. being the creditor, summonses N. to the County Court, and obtains a verdict. N. obtains a new trial, is again cast, and pays the money. Not satisfied with the decision, he summonses M. to the County Court with a view of making him refund. A third time the verdict is against him. He then proceeds to lay an information against his opponent, who is a Physician, for practising as an Apothecary without the licence. The case is tried in the County Court; the solicitor who had acted on the three former occasions for the informer, now acts on behalf of the Master and Wardens of the Apothecaries' Company against the informer's opponent. Need we ask whether this is a creditable position for the Master and Wardens to assume? This, however, is an illustration founded on fact, and showing how hazardous it is to allow the Act to be tampered with by any person, who, for his own private ends, may be willing to take on himself the *pecuniary* responsibility of a prosecution. The *moral* responsibility must, under all circumstances, rest on the Master and Wardens, in whose name the action is brought; and upon them rests the disgrace, in the event of a disgraceful defeat.

In another part of this number will be found the report of a recent trial at Watford, to which some of the foregoing remarks are applicable.

In the case of the Master and Wardens *versus* Wells, reported last month, the real actors in the scene were Collins the Apothecary and Collins the Chemist, backed by the Medical-Bread-and Cheese Society, aided and abetted by the Master and Wardens of the Worshipful Society of Apothecaries, against Wells, a rival Chemist. A formidable array of conspirators to crush a victim! Among all the actions which have been brought by the Master and Wardens of the Worshipful Society from the year 1815 to the present day, we have never heard of one which could not be traced directly or indirectly to some private pique or jealousy between individuals. We will not undertake to say that no genuine case has occurred, in which proceedings have been commenced on *principle:* all we say is that we have never heard of such a case.

TRANSACTIONS
OF
THE PHARMACEUTICAL SOCIETY.

THE CONVERSAZIONE

Given by the President, Mr. T. N. R. Morson, at the house of the Society, on Monday evening, the 14th of May, was honoured by the presence of many distinguished scientific men, and by a large number of Members and Associates of the Pharmaceutical Society. The rooms were prepared as usual for the reception of the company by the display of numerous objects of interest, for many of which the President was indebted to the kind assistance of his scientific friends.

One of the principal attractions of the evening was the great electro magnet from the Royal Institution, which had been kindly lent for the occasion by Professor Faraday, and which excited the more interest, as having been the instrument with which Dr. Faraday's recent discoveries in relation to the magnetic force were made. The company amused themselves in testing the wonderful powers of this magnet, which are so instantaneously developed when the electric current is established, and which almost as rapidly disappear on breaking contact. The experiment which appeared to excite most astonishment was that showing the resistance offered by the magnetic force to the motion of a disc of copper made to revolve on its axis between the poles of the magnet.

Much interest was also excited by a set of very beautifully constructed models, illustrating the anatomy of the leech, the snail, the silk-worm, the cockchafer, and the organs of voice, and other parts of the human body. These models are made of a kind of papier-maché, by Dr. Auzoux, of Paris, and were exhibited by Dr. Lemercier. The models of the leech, snail, &c. are about twelve times the natural size, and exhibit the complete anatomy of the animals, that of the snail alone presenting more than six hundred objects of detail.

Among the botanical specimens were some from the collection of Dr. Robert Brown, including a fine specimen of the *Xanthorrhœa arborea*, with a section showing the position of the resin, commonly called Botany Bay Gum, part of which is produced by this plant; also the entire plant of *Kingia Australis*, with a section, showing the curious manner in which the roots descend through the trunk for the support of the tree. This plant is commonly called *Black Boy* in Australia, from the resemblance of the tree to a human figure, and from its being frequently charred and blackened on the surface by the fires which are employed in clearing the ground. There was also among the specimens from Dr. Brown's collection, a piece of the trunk of a tree, illustrating the

exogenous growth. Some person having carved the figure of a man hanging, on the surface of the trunk of a tree, this carving, after the lapse of many years, was found several inches beneath the bark, the depositions having been annually made over its surface ; and although the figure was still retained in the bark, there was no trace of it in the wood intervening between this and the part within the tree where the carving was found.

There were several specimens of tropical vegetation from Messrs. Loddige's, of Hackney; and among the plants from this collection were the Camphor tree, and the *Xanthorrhœa hastilis*, which latter, as well as the *Xanthorrhœa arborea*, yields the resin called Botany Bay Gum. There was a large collection of Xanthorrhœa resin from the Society's collection.

Mr. Redwood exhibited an apparatus, which he had received from Berlin, for showing the compressibility of water, and for the liquefaction of gases. This is a very elegant and efficient arrangement for showing the results indicated in the lecture room. The water to be compressed is contained in a glass bulb, to which a tube is attached, having a capillary bore. The bulb and tube being filled with water, the open end of the tube is plunged into a cup of mercury. A graduated tube filled with air is placed by the side of the other, the open end of this being also immersed in the mercury. These parts of the apparatus, thus arranged, are placed within a very strong glass cylinder, which is then filled with water. The glass cylinder is mounted with brass at each end to give it greater strength; and at its upper end, where a brass cap is fitted on with a screw and water-tight joint, there is a small solid-pistoned forcing pump and a cistern of water, by means of which more water is forced into the cylinder. The pressure thus effected within the cylinder, is indicated by the compression of the air contained in the graduated tube, the mercury being forced up into the tube in proportion to the pressure. Compression is also found to be effected in the water contained in the glass bulb, and this is indicated by the mercury rising in the capillary tube attached to the bulb. In effecting the liquefaction of gases with this apparatus, tubes filled with the gases, and their open ends immersed in the cup of mercury, are substituted for the bulb containing the water. Three or four tubes, containing different gases, may thus be introduced at the same time, and the pressure at which liquefaction takes place determined with great facility and accuracy.

Among the other specimens on the tables were the olive tree, *Olea europœa*, some fine crystals of yellow and red prussiate of potash, and recently dried hemlock leaves, from Mr. Squire.

A fine collection of minerals from Mr. Tennant, of the Strand, together with numerous specimens of this class from the President's own collection.

A very interesting set of specimens, which were recently presented to the Museum of the Pharmaceutical Society by Dr. Christison, illustrating the natural formation of plumose alum by the gradual oxidation of the alum slate. A description of these specimens will be read at the next evening meeting of the Society.

Messrs. De la Rue's recently patented process for colouring ornaments by the deposition of thin films of the colouring matter, producing effects similar to Newton's coloured rings, was illustrated by specimens.

There was a large collection of portraits, and other pictures, taken by the Daguerreotype and Calotype processes, from Mr. Claudet and Mr. Malone. Among the portraits were those of Faraday, Fownes, and Grove.

Two curious old paintings, representing ancient pharmaceutical and philosophical establishments in Germany, from Mr. Huxtable.

A geological drawing of part of the coast of Scotland. A series of Chinese plates, illustrating the manufacture of silk, cotton, and porcelain in China; also Chinese anatomical drawings.

A drying closet for Chemical operations, from Mr. Griffin.

Siemin's patent air-pump, and Dr. Normandy's gas blow-pipe, from Mr. Knight.

Mr. Varley Jun. also exhibited an air pump on a new construction, made by himself, and his father afforded, as usual, much amusement with his microscope.

EIGHTH ANNIVERSARY
OF
THE PHARMACEUTICAL SOCIETY,

Held at 17, *Bloomsbury Square*, *May* 15*th*, 1849.

Mr. Thomas N. R. Morson, President, in the Chair.

The President commenced his address by congratulating the Members on the favourable Report which was about to be read, observing that the eight years which had passed since the establishment of the Society had not been unprofitably employed. Something had been done for the Members as well as for their successors. The last President (Mr. Savory) had introduced the practice of reading an oration to the Members at the Anniversary. He (Mr. Morson) should not, on the present occasion, follow this example, pressure of other occupations having prevented his devoting the needful attention to the preparation of such an address: he should therefore attempt no more than a running commentary on the Report, with a brief allusion to the progress of Chemical Science generally. In regard to modern discoveries nothing very brilliant had occurred during the past year: in fact, the only one which occurred to him, having a direct practical reference to the

business of the Pharmaceutical Chemist, was the solution of gun cotton in the form of collodion, which had become extensively used as an external application. He would not enlarge upon a certain class of inventions and discoveries, commercially announced in the newspapers in advertisements, further than to give a word of advice to those who are in the habit of issuing such announcements, while giving publicity to their own preparations, to avoid disparaging others, or indulging in language calculated to create feelings of jealousy and to associate the parties with the quacks of the day.

Recent events in this country and on the Continent had been unfavourable to the development of science. The attention of the public had been directed more to the manufacture of bullets for the destruction of life, than to the improvement of useful scientific arts for the benefit of mankind.

The President then briefly alluded to the three grand objects of the Society, namely, protection—professional character—and benevolence. The bond of union created by the formation of the Society had been of great service, and was a good illustration of the fable of the bundle of sticks, which, when united, could not easily be broken. On several occasions attacks had been resisted, in opposing which individual influence would have been ineffectual. For instance, in the recent proceedings of the Medical Protection Society, an insignificant body, it was true; yet it was clear that if some means had not been adopted to ward off the evil, the result might have been injurious. The existence of a well organised Society was a great safeguard against such attacks ; and so long as this union existed, there would be nothing to fear from the aggression of the new faction. The case of Mr. Wells had been indirectly assisted by the Society, although the Council could not officially act in reference to it, Mr. Wells not being a Member.

In regard to education, the efforts of the Society had been on the whole quite as successful as could be expected. A general interest had arisen, and was spreading far and wide, in the acquirement of knowledge; and many young men, who had been instructed in the school, had done credit to themselves and their teachers. There was however reason to regret the apathy manifested by the young men generally for whose benefit the school was established ; the number who availed themselves of it bearing but a small proportion to that of the Associates and Apprentices within reach of the establishment. In some cases probably, the business arrangements might interfere, or the value of scientific knowledge was not sufficiently appreciated. It could scarcely be supposed for a moment that the fear lest the rising generation should be superior in qualification to the present race of Chemists, could operate as a discouragement to education. Such an idea was too monstrous to be entertained. The world

was always progressing. Every class in society must improve, and it could not be supposed that the Chemists would be the only exception. It was only on the ground of improved qualification that the Chemists could hope to enjoy legislative protection, or to raise themselves in the public estimation.

The exertions of the Board of Examiners ought not to be passed over in silence. Their duties were very onerous, occupied much time, and in their result exerted a very important influence on the character of the Society.

The scientific world had sustained a loss during the past year in the decease of the great Berzelius; and the Society had to deplore the loss of one of its professors, Mr. Fownes, who enjoyed a high reputation as a Chemist.

The Benevolent Fund was a subject of congratulation, but in adverting to it the President was reminded of the decease of a late Member of the Council, Mr. Tosswill, who had taken an active part in compiling the rules now in force. The Members would find a satisfactory statement respecting the Benevolent Fund in the Report, to which he now begged to direct their attention.

REPORT.

The recurrence of another Anniversary of the Pharmaceutical Society imposes on the Council the duty of presenting to the Members the Eighth Annual Report, in which the principal operations and occurrences affecting the Society during the past year will be noticed, as usual, under separate heads.

RECEIPTS AND EXPENDITURE,

FROM JANUARY 1st to DECEMBER 31st, 1848.

Dr.

	£	s.	d.
Life Members' Subscriptions 21 0 0			
Interest..... 20 18 0			
	41	18	0
Benevolent Fund Interest..... 81 15 5			
Subscriptions..104 9 0			
Dinner Stewards..807 3 0			
	993	7	5
Druggists' Old Fund, Interest	32	16	6
Government Securities, Interest.....	94	13	2
330 London Members	519	15	0
1255 Country Members	1317	15	0
Entrance Fees	25	4	0
679 Associates	356	9	6
314 Registered Apprentices ...	164	17	0
Registration Fees	25	12	6
Subscriptions, 1847	23	2	0
Lecture Fees	96	12	0
Balance from Laboratory	57	17	2
£	3749	19	3

Cr.

	£	s.	d.
Balance due to Treasurer	312	9	0
Benevolent Fund Investment 795 12 0			
Disbursement 10 0 0			
	805	12	0
Postage.....	27	9	10
Delivery of Journals	153	13	10
Stationery	15	15	8
Advertisements	5	16	0
Salaries.....	305	0	0
Wages	142	10	0
Journals	675	0	0
Printing.....	19	18	6
Commission.....	54	17	9
Law Costs	6	17	6
House Expenses	53	1	4
Sundries	17	15	2
Lectures	522	14	4
Laboratory	166	13	6
Library	16	17	0
Fixtures and Fittings	7	0	0
Travelling Expenses.....	29	3	6
Rent, Rates, and Taxes	365	5	10
Balance in Treasurer's hands	46	8	6
£	3749	19	3

We, the undersigned Auditors, have examined the Accounts of the Pharmaceutical Society, and find them correct, agreeably with the foregoing Statement; and that there was standing in the names of the Trustees of the Society at the Bank of England, on the 31st of December, 1848,

		£	s.	d.
On Account of the General Fund	.....3¼ per Cent. Reduced	3000	0	0
Benevolent Fund	.....3 per Cent. Consols...	3447	11	8
Druggists' Old Fund, New 3¼ per Cents....		1036	7	1
Life Members' Fund, 3 per Cent. Consols		717	19	9

And we find that the following sums were due to the above-mentioned Stock:—

Life Members' Fund	62	18	0
Benevolent "	187	15	5
Druggists Old "	49	4	9

Henry Taylor.
William Jackson.
Richard Kelland.
Alex. Hemingway.

16*th April*, 1849.

From the above statement it appears that the income of the Society during the past year exceeds the expenditure by the sum of £358 17*s.* 6*d.*, the balance in the hands of the Treasurer at the end of the year being £46 8*s.* 6*d.*, while at the beginning of the same year there was a balance due to him of £312 9*s.* Deducting £299 18*s.* 2*d.* due from the General Fund to the three Special Funds above named, there is still a balance of £58 19*s.* 4*d.* in favour of the Society, exclusive of the sum of £795 12*s.*, the proceeds of the Benevolent Fund Dinner, which is invested.

There is a slight deficiency in the number of Members as compared with the number reported last year. This arises from the circumstance that some subscriptions had not been received at the time the account was closed.

In the Transactions of the Society for January, the Council published an analysis of the list of defaulters during the previous five years, with the result of a circular which had been issued, requiring those who had seceded from the Society to return the Certificate of Membership.

The Council considered it to be their duty to take this step for the protection of the Members from the unfair conduct of those who had joined the Society for the purpose of obtaining the "Diploma," and continued to exhibit this evidence of their Membership after they had ceased to be Members. As this document is becoming every year more valuable, from its showing that the possessor has either passed an examination, or had been in the business prior to February, 1843, the Council considered that the time had arrived when it was necessary for the Society to avail itself of the powers conferred by the Charter and Bye-laws. In many cases, the circular above alluded to produced the effect, and the diplomas were returned; in others the arrears have been paid

up, and the Members re-admitted. Some cases are still under the consideration of the Council, and measures are in progress under legal advice, by means of which the powers possessed by the Council will be enforced. The fraudulent use of the name of the Society by persons who have never been connected with it has also engaged the attention of the Council, and the measures above alluded to are also directed to the suppression of this description of imposition.

In reference to the list of defaulters, the Council think it right to remark, that the number of Members admitted during the five years to which that list refers, amounts to 720, being an excess of 50 over the entire number of defaulters, of whom 234 may be accounted for by death and other casualties.

PHARMACEUTICAL LEGISLATION.

Under a continued conviction that an Act of Parliament is necessary to complete the undertaking which the Society has commenced, the Council have devoted their attention to this subject, and renewed the communication with the Secretary of State, whose sanction and approval it has always been considered desirable to obtain prior to the introduction of a Bill into Parliament.

A hope was at one time entertained that the Secretary of State would be prevailed upon to introduce the Bill; but the support of the Government not being yet accorded, the Council contemplate preparing for its introduction through another channel as soon as it is ascertained that the general principles and objects are approved by the Government. The draft Bill, published last year in the Transactions of the Society, appeared to require modification, chiefly in reference to professional phraseology and arrangement, and it has therefore undergone revision by a member of the legal profession. A copy of the amended Bill was forwarded to the Secretary of State, and in consequence of that officer having referred the Solicitor of the Society to the Lord Advocate, as Chairman of the Medical Reform question, a deputation of the Council has an appointment to attend the Lord Advocate on the subject.*

THE PROTECTION OF THE MEMBERS OF THE SOCIETY.

During the past year, the attention of the Council has been directed to several questions in which the interests of the Members at large are concerned, and which afford a demonstration of the utility of a representative body acting on behalf of the Members in cases in which individual influence would be ineffectual or inoperative.

* At the interview which took place on the 16th of May, the Lord Advocate did not discourage the deputation, but adjourned the further consideration of the question to another interview.—(Ed.)

THE MEDICINE STAMP ACTS,

in their practical application, may be mentioned as a source of persecution and injury, being so ambiguous and intricate in their provisions, that they have on many occasions involved in perplexity and expense, persons who had no intention of offending against the law, but who had incurred penalties while they were not aware that they had transgressed, until this information arrived in the form of a writ. The investigation of the subject by the Council, and the applications at Somerset House on behalf of the Society, have led to a more clear and explicit declaration on the part of the Commissioners of Stamps respecting the actual meaning and intention of the several provisions of the Acts; and by this means, many Members have escaped penalties which they might otherwise have incurred.

THE PROSECUTION OF CHEMISTS FOR ADMINISTERING MEDICINES AND DISPENSING PRESCRIPTIONS,

has also engaged the attention of the Council. These proceedings have been instituted by a new Society, called the Medical Protection Society, the object of which is to collect the debts of Medical Practitioners, and to prosecute Chemists and others for interfering with what is held to be the exclusive prerogative of Apothecaries. Only one case has occurred in which a Chemist was the subject of the attack. In this case the defendant not being a Member of the Society, the Council could not officially interfere, but several Members, in their individual capacity, attended the trial, and assisted in supporting the rights of the trade by furnishing the requisite evidence.

In the event of a similar attack being made upon a Member of this Society, it would be the duty of the Council to come forward officially to assist in the defence. There is reason to believe, however, that proceedings are not likely to be commenced against Members of the Society, as the parties concerned in this prosecution are too well aware of the risk they would run in hazarding a trial of strength with a united body like the Pharmaceutical Society, on a question of such vital importance as the right to dispense prescriptions, and to carry on the business of a Chemist and Druggist "in the same manner as fully and amply as the said trade or business was carried on" before the passing of the Apothecaries' Act of 1815. In the *Medical Protection Circular* for April, the following significant observation occurs in an address read at a meeting of the members of that body:—

"The Medical Protection Office has been the repository of various extraordinary revelations, the particulars of which must not be made public, but it hears on one hand of an influential body, who, having a fund, are determined to oppose its designs."

The Members of the Pharmaceutical Society will thus perceive that their union affords to them increased security from aggression, and better means of defence when attacked.

THE SCHOOL OF PHARMACY.

The promotion of a better system of professional education among the body of Pharmaceutical Chemists in this country, has formed a leading feature in the objects and operations of our Society from its first establishment to the present time. The association of the founders of the Society was chiefly induced by a conviction that a progressive improvement in the cultivation of Pharmaceutical knowledge by Chemists and Druggists was requisite in order to secure and maintain to them the confidence and support of the public and the Medical profession. The progress which Physicians, Surgeons, and Apothecaries had made, in raising the standards of qualification among their members, rendered a corresponding advancement necessary on the part of the dispensers of medicines ; and had the Chemists and Druggists neglected to take part in the competition for improvement which prevailed elsewhere, they would deservedly have experienced the interference which has, from time to time, been threatened by other branches of the profession. The School of Pharmacy was, therefore, established as an essential part of the means adopted for raising the character and improving the position of the body of Pharmaceutical Chemists. This school has now been in operation for seven years ; and although the attendance of pupils at the lectures has fallen short of the expectations that were formed, there is abundant evidence of the benefits which it has conferred upon those who have availed themselves of the means of instruction afforded. The number of pupils, resident in London, who have attended the lectures during the last year has been smaller than usual ; but, although there is some cause for discouragement in this apparent indifference to the advantages of scientific instruction, on the part of a numerous class of young men who reside within reach of the school, yet it has been otherwise with regard to those coming from the country.

The attendance in the laboratory has been more numerous this year than in any previous season. Thirty-one pupils have entered the laboratory since October last, of whom a large majority have come from different parts of the country to devote a certain period of time to the completion of their professional education. Thirteen of these have been registered Apprentices, and four were Associates of the Society. The remainder were previously unconnected with the Society, but entered the laboratory with the view of preparing for the Examinations, by which alone they could be admitted as Members. Eighteen of the

above have already passed the Minor, and eleven have passed the Major Examinations.

It is satisfactory to observe that an increasing number of registered Apprentices are thus availing themselves of the facilities afforded by the Society for the acquirement of that practical and scientific acquaintance with the several branches of learning required, in addition to an apprenticeship, to complete the qualification of the Pharmaceutical Chemist. These young men having subscribed to the educational scheme of the Society, on entering the business as Apprentices, have thereby recognised the necessity for scientific culture, as well as an acquaintance with those operations which are daily performed at the counter; and there is reason to believe that the fact of their being registered, as the first step in the improved system of Pharmaceutical Education, tends to induce habits of study, and of application to the acquirement of knowledge, in anticipation of the Examinations which they have subsequently to pass.

The Council would urge upon the consideration of those pupils who come to the School without having had any previous opportunity of acquiring scientific instruction in Chemical and Pharmaceutical operations, or of studying systematically the branches of science connected with their art, that it will be greatly to their interest to devote such a length of time to these studies as shall enable them to become well grounded in the knowledge of Chemistry, Botany, and Materia Medica. The mere superficial knowledge of these subjects which may be gained in a few months, is generally, to a great extent, evanescent, being insufficient to form a permanent foundation, to which the occasional experience of subsequent years might add strength and stability, and by the continued cultivation and application of which, lasting benefits might be conferred upon the possessor. They trust that the facilities for scientific culture which are afforded in the lecture room, the laboratory, the extensive museum, and the library of the Society, may not be looked upon as mere means for enabling pupils to pass an examination; but rather that the examination should be viewed as a stimulus to the student in the acquirement of a degree of proficiency that shall render him more successful in his professional pursuits, more creditable to the body to which he belongs, and more useful to the public.

The Council have been led to make these remarks from having observed that, although the number of pupils in the laboratory has increased, yet a larger proportion of them have latterly entered for short periods than was formerly the case. The scheme of education provided by the Society extends through a period of ten months; and there is no part of the subjects comprised in this

scheme, with reference to which a well qualified Pharmaceutist should be ignorant.

BENEVOLENT FUND.

The Council have much satisfaction in referring to the successful result of the means adopted last year for augmenting this fund, which continues steadily to increase in importance. It is also satisfactory to find that there have hitherto been no applicants for permanent relief from this source; for while it affords evidence of exemption among the Members from those visitations to which even the most prosperous are exposed, it has admitted of annual investments being made, by which more efficient provision is secured against the time of need.

In conclusion the Council would remark, that in taking a retrospective view of the progress of the Society, they think there is ground for encouragement and satisfaction. The individual Members of the Society have been strengthened in the means of defence against threatened aggression, encouraged and assisted by mutual co-operation, and stimulated through the influence of association in the acquirement of improved technical and scientific knowledge; and the body of Pharmaceutical Chemists have been relieved from the stigma which previously attached to them, for being unorganized and disunited, having no provision for professional education, and no test of qualification for the responsible duties in which they are engaged.

Mr. Phillips, of Luton, moved the adoption of the Report, observing, that it was so complete and well digested, that it had done much to remove some doubts which had previously existed in his mind as to the value of the Society. Comparing the income with the expenditure, it was satisfactory to find the balance on the right side; and in looking over the items, he thought some of them so moderate in amount, as to evince much economy and care in the expenditure of the funds. He would mention, for instance, the Professors' fees, the Library, the Law Costs, and the Journal. He would be glad to see an improvement in the character of the Journal, and suggested that a fund might be set apart for this purpose, to be applied in its enlargement, and in payment for original articles. The defensive operations of the Society were, he thought, very important, as it is well known that old laws are sometimes revived, and obsolete enactments, when thus raked up, may become oppressive, unless some means of resistance exist. To complete the operations commenced by the Society, an Act of Parliament must be obtained, and he hoped this would shortly be the case. It was natural and proper that each generation should improve in attainments. Some Chemists of the present day had done voluntarily what their successors would be obliged to do. Much credit was due to those who thus distinguished themselves without the stimulus of an Act

of Parliament, but the majority required this stimulus. He had much pleasure in moving,

"That the Report now read be adopted, and be printed in the Transactions of the Society."

Mr. Boyce, of Chertsey, seconded the Resolution, which was carried unanimously.

Mr. Jacob Bell made a few observations on some of the subjects introduced in the Report, stating several cases in which the Society had afforded pecuniary advantage to the Members, by saving them from penalties originating in frauds, which had been exposed and frustrated. He pointed out the importance of watching any proceedings which might take place affecting the general interests of Chemists, observing, that in the case of Mr. Wells, if the needful evidence had not been at hand, the statements of the counsel for the plaintiff might have influenced the jury, and thus a precedent might have been created, which would have given rise to many other prosecutions, each being attended with much annoyance and expense. The Medical Protection Society had been more quiet since the defeat, and he trusted that, by continued vigilance, its ridiculous endeavours to suppress Dispensing Chemists would be frustated. In one part of the Report the language was less strong than the circumstances appeared to warrant. He alluded to the apathy of the young men in not availing themselves of the lectures. The Council were unwilling to be too severe on this subject, but he (Mr. Bell) might in his individual capacity appeal to his brother Members, and ask them whether they exerted themselves properly in encouraging their young men to attend? He was sure they would find it conducive to their interest to do so. He had observed in his own experience, that those young men who were most desirous of improvement were the most useful hands; and he adopted the practice of raising the salaries of those who passed a creditable examination. Experience had shown that this encouragement to industry was well bestowed and amply repaid in the more efficient services of young men thus qualified. The improvement of the Journal having been alluded to, he thought it right to observe, that the plan proposed already existed to a certain extent, no expense being spared in the purchase of original articles when opportunity offered, and in the illustration by wood-cuts, when the subjects appeared to require it.

Mr. Hallows moved

"That the Thanks of the Meeting be given to the Council for their services during the past year."

Mr. Constance seconded the resolution, which was carried unanimously.

Mr. Herring, on behalf of the Council, returned thanks. He was glad to find the balance on the right side, though small; he always objected to the words "balance due to the treasurer," and hoped that this would not occur again. He was glad the meeting concurred with him in considering the Report favourable, and thought some benefit had arisen from a recent visit of one of the Members of Council to Newcastle. The Members in the Country were beginning to see more

clearly the value of the Society as a means of protecting their interests. In asking for protection, the Chemists must prove that they wish to improve themselves, and do what is right, and that they are worthy of respect. The Benevolent Fund appeared to be flourishing. In this matter, deeds were better than words, and the subscription raised at the dinner might be considered a prelude to future prosperity. If the Members would support the Council, he trusted all the objects of the Society would be carried out.

Mr. Edwards explained, in reference to an observation of Mr. Phillips, that the Professors' fees were not included under the head of Salaries, but in the item of lectures; and wished the Members to understand that all the Professors engaged were men of the first eminence.

Mr. Fordred, observing how small a sum was received as fees from Students, suggested that the lectures might be thrown open without fee, which he thought would secure a good attendance.

Mr. Pedler observed that the subject had been repeatedly considered. It was thought that the small sum required as fees could not be an obstacle. The Country Members might complain if the lectures were thrown open without fee to those in London. He hoped an improvement would take place.

Mr. Bell said the experience of the Council had led to the belief that the reduction of the fees would not have the desired effect. The fees were originally less than at present: the attendance was not very good. The Council doubled the fees, and the number of Students increased. It was easy to take a horse to the water, but not so easy to make him drink. If young men had not the good sense to attend lectures at the moderate fees charged by the Society, they would not attend even if they were paid; and if they could attend for nothing they certainly would not take the trouble to come.

Mr. Standring, of Manchester, confirmed this opinion. Some time ago a course of lectures was delivered at Manchester at a small fee. The attendance was pretty good. Another course was delivered without fee, and the attendance was worse. He looked forward to the time when education would be compulsory. The Members in the country were sorry to hear of the apathy of the London Assistants and Apprentices.

Mr. Waugh observed that as long as the Society is voluntary every thing must be done by individual exertions and influence, by prevailing on young men to go, making it easy for them, and instilling into their minds a desire for knowledge. This would do more good than reducing the fees.

Mr. Humpage thought the Members and Associates were very imperfectly acquainted with the proceedings of the Society. He frequently came in contact with Chemists in the country, who asked "What is going on?—is the Society doing anything?" He generally inquired, "Do you read the Journal?"—and the usual answer was "No." Which accounted for the questions.

The Chairman then submitted to the meeting the list of Candidates for election as Members of Council, in the place of those who go out of office by lot, agreeably with the provisions of the Charter; and no other names having been proposed, the list was carried as follows:

COUNCIL.

BARTLETT, WILLIAM, 1, Brittin Terrace, Chelsea
BELL, JACOB, 338, Oxford Street
BIRD, WILLIAM L., 42, Castle Street, Oxford Market
DAVENPORT, JOHN T., 33, Great Russell Street
EARLAND, JOHN, 172, Bond Street
EDWARDS, GEORGE, Spital Street, Dartford
GARLE, JOHN, 12, Kensington Terrace, Gravel Pits
GIFFORD, JOSEPH, 104, Strand
GLAISYER, THOMAS, 12, North Street, Brighton
HANBURY, DAN. B., Plough Court
HERRING, THOMAS, 40, Aldersgate Street
HOOPER, WILLIAM, 24, Great Russell Street, Covent Garden
INCE, WILLIAM, 31, Southampton Street, Strand
MORSON, THOMAS, N. R., 19, Southampton Row
PALK, JOHN, 82, St. Sidwell's Street, Exeter
PEDLER, GEORGE S., 199, Fleet Street
PIGEON, RICHARD H., 31, Throgmorton Street
SANDFORD, GEORGE W., 47, Piccadilly
SAVORY, JOHN, 143, Bond Street
SQUIRE, PETER, 277, Oxford Street
WAUGH, GEORGE, 177, Regent Street

AUDITORS.

HAWXBY, THOMAS, 37, Berners Street
HEMINGWAY, ALEXANDER, 28, Portman Street
KELLAND, RICHARD, 21, Nelson Street, Greenwich
TAYLOR, HENRY, 10, Pall Mall
WYMAN, JOHN, 122, Fore Street

Mr. HOOPER, of Russell Street, moved, and Mr. ORRIDGE seconded a vote of Thanks to Mr. Bell, for his attention to the interests of the Society, as Editor of the *Pharmaceutical Journal.*

The resolution having been carried, Mr. Bell acknowledged the compliment, observing that he had always felt much satisfaction in doing his part towards promoting the prosperity of the Society, and hoped it would continue to increase in strength and influence. It was only by the united efforts of the Council, backed by the Members at large, that this could be attained.

Mr. HALLOWS moved a vote of Thanks to the Chairman, alluding to his services as President, an office which had been filled by several predecessors much respected and esteemed; he also adverted to the Conversazione given by the President on the previous evening, which had given much satisfaction to all the Members and Visitors, besides affording useful information by the exhibition of numerous interesting objects of art and science.

The resolution was carried unanimously.

THE CHAIRMAN having briefly returned thanks, and vacated his seat, the chair was taken by Mr. Bell, and

Mr. WAUGH, at the suggestion of the Pupils in the Laboratory of the Society, moved "That the Thanks of the Meeting be given to Mr. Redwood, for his kind attention to the Pupils under his tuition."

Mr. RALPH STAMPER seconded the motion, which was carried unanimously.

Mr. REDWOOD returned thanks, and the Meeting then separated.

ORIGINAL AND EXTRACTED ARTICLES.

OF THE PLANT WHICH YIELDS PATCHOULY.

BY DR. PELLETIER-SAUTELET.

The odorous and for some years past very fashionable leaves called *Patchouly*, employed by ladies as a perfume, and for driving away insects*, is an undershrub cultivated under the name of Patchouli by amateurs and in botanical gardens. The leaves of our plant completely agree with the Patchouly of the perfumers: not so the leaves of *Pascalia glauca*, Ort., one of the Compositæ, frequently called by horticulturists Patchouly, but which have no resemblance to the genuine Patchouly, and have, moreover, a terebinthinate odour which readily distinguishes them from the leaves used by perfumers.

By its foliage and habit, the Patchouly, especially when cultivated in pots, much resembles many Indian and hot-house plants; but particularly *Volkameria*, and especially *Clerodendrum*. Some persons have considered it to be one of the Verbenaceæ; but this is an error, for it is a labiate plant; and Endlicher and Ad. de Jussieu were very near the truth when they declared it to be a species of *Coleus*. Having found that it was an undescribed species of *Pogostemon*, M. de Tristan and myself have given it the specific name of Patchouly, as being, in our opinion, preferable to any other; for it is by this name that it is generally known.

POGOSTEMON PATCHOULY.

P. pubescent; stem shrubby, procumbent at the base; leaves petiolate, ovate acute, wedge-shaped at the base; coarsely dentate; spikes† terminal and axillary, on long peduncles, interrupted at the base; cymes dense, longer than the bracts; bractlets shorter by half than the calyx; tube of the corolla exserted; upper lip spotted; teeth of the fructiferous calyx connivent, lanceolate.

Description.

An *undershrub*, procumbent at the base; 2 metres (6½-feet) and more long; denuded below; somewhat ash-grey; pubescent.

Root fibrous.

Stem at the base scarcely exceeding the thickness of the index finger; or many stems, 2-3, thinner, shorter, unequal in thickness and length.

Principal *branches* elongated slender; the old ones like the stems, the adult ones obsoletely, the young ones perfectly, tetragonal; the internodes, at least the lower ones, long, oblong, and somewhat incrassate at the base, with two opposite furrows, which are deeper in dried specimens.

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* The ladies will regret to find that these leaves no more possess the property of driving away insects than the flowering tops of lavender and thyme, powdered pepper, camphor, retiver (*Andropogon muricatum* Beauv.), and many other substances to which the same property has been assigned. It is now well known that it is not to these substances, but to the precautions with which their use is accompanied, that the supposed good effects of their employment are in reality referable.

† Dr. Pelletier-Sautelet terms the spiciform inflorescence of this plant, *spicastra*, for which Mr. Bentham (De Candolle's *Prodromus*, pars. xii, p. 153) has substituted the word *spica*.—Transl. Ph. J.

Leaves opposite, one a little smaller, on long stalks which are longer than one-half the blade, broadly ovate, acute, at the base wedge-shaped, and shortly attenuated, coarsely or acutely, or rather acutely unequally duplicato-dentate, somewhat serrate, the teeth being obtusely, or rather acutely serrated, soft, green above, paler beneath, strong smelling, with small innumerable glands visible by the aid of a powerful lens.

Inflorescence spiciform.

Peduncles long, shorter by about half than the spike, sometimes equal.

Spikes terminal and lateral, somewhat panicled, the terminal ones 8 centimetres (about $3\frac{1}{7}$ inches) in length at the most, interrupted at the base, the lateral ones shorter or equal to the entire leaves.

Bracts [floral leaves] broad-lanceolate, on both sides acute, quite entire, not unfrequently pale violet at the apex.

Whorls (Verticillastri) crowded, dense, longer than the bracts.

Cymes, many flowered, sessile, surrounded by bracts.

Bractlets [bracts] apprest, disposed in 3 or 4 rows, quite entire, on both sides acute, the external ones broad-lanceolate, half as long as the calyx covering the internal narrower ones, the inferior ones linear.

Flowers closely crowded, sessile, inodorous.

Estivation of the calyx, valvular.

Calyx obovato-lanceolate, subfusiform, 6 millimetres [nearly $\frac{1}{4}$ of an inch] long, subacute at the base, 5-toothed, 5-striated, the nerves opposed to the teeth. *Teeth* equal, lanceolate, acute, pubescent within. *Tube* obconical.

Corolla bilabiate, smooth and whitish. *Tube* exserted. *Upper lip* obtusely 3-lobed ; the lobes marked with a purple spot evanescent after flowering, unequal, quite entire ; the spots confluent at the base. *Lower lip* almost one-half shorter than the upper one, quite entire.

Stamens, four didynamous, nearly equal. *Filaments* straight, with long, unequal, flexuous, spreading violet or bluish purple hairs, resembling the colour of the flower. *Anthers* small, roundish, compressed, unilocular by confluence, pale yellow, after flowering whitish. *Connectivum* scarcely any. *Pollen* yellowish, afterwards whitish.

Pistil very smooth, usually somewhat longer than the stamens. *Style* filiform, very pale purplish, below whitish, at the apex deeply cleft. *Stigmata* punctiform, whitish, almost invisible to the naked eye. *Ovaries* four, distinct, whitish, ovoid, obtuse. *Gynophore*, beneath convex, subhemispherical, almost entire at the margin, sometimes glanduliferous at the base.

Mature calyx and fruit not seen.

Grows probably in humid places.

Flowered at Orleans on the 14th February. [It has recently flowered at the Kew Gardens.]

[We have already laid before our readers some account of *Patchouli*, see *Pharmaceutical Journal*, vol. iv., p. 80, 1844, and vol. vi., p. 432, 1847. A very interesting account of it is given by Dr. Wallich in Dr. O'Shaughnessy's *Bengal Dispensatory* (p. 493, 1842), the most important parts of which were embodied in Dr. Pereira's notice of Patchouli in the 4th vol. of the *Pharmaceutical Journal*.—Ed. Ph. J.]

POGOSTEMON PATCHOULY.

a. Flowering top of natural size. *b*. A flower magnified.
c. One of the largest leaves.

SPURIOUS CHEMICALS.

We have repeatedly had occasion to direct the attention of the readers of this Journal to the adulteration of drugs. It is now our duty to notice a system, which appears to have prevailed to a considerable extent, not of adulteration, but of the wholesale substitution of comparatively worthless compounds, for valuable and powerful medicinal agents. Within the last few years compounds of valerianic acid with oxide of iron, with oxide of zinc, and with quina, have been introduced into medical practice as efficacious remedies, especially in hysteria, and other affections of the nervous and uterine system, and in fevers. A good deal of attention has been devoted by practical Chemists to the preparation of these valerianates, and several processes for making them have been published in this and other Journals. The valerianates, however, have always, and necessarily, been expensive preparations, yet the use of them has been gradually extended in consequence of the testimony borne to their great efficacy. Increased demand led to competition in the supply, which has recently resulted in the adoption, by some manufacturers, of a system of substitutions that would have speedily brought a valuable set of remedies into disrepute, had not the fraudulent practice been detected.

Citrate and tartrate of iron, flavoured with a few drops of oil of valerian, has been extensively supplied for valerianate of iron; and acetate of zinc, flavoured in the same way, has been substituted for valerianate of zinc; and these spurious compounds have been sold at prices which, although defying competition on the part of the genuine valerianates, have nevertheless been twenty or thirty times greater than the commercial value of the substituted articles. For valerianate of quina the disulphate of that base, with a little oil of valerian to disguise it, has been in like manner substituted.

Thus compounds have been supplied for the three medicinal valerianates, which have not contained a particle of the most important of the constituents which should have been present, namely, the valerianic acid.

Such being the nature of the frauds which have been practised, we have no doubt, upon many of our readers, we proceed to point out the means of detecting them.

1. *The true valerianates* have a sour, disagreeable, and very persistent, although not powerful smell, which is essentially different from that of oil of valerian.

1. *The spurious imitations*, being flavoured with oil of valerian, smell strongly of that substance.

2. *The true valerianate of iron* is almost entirely insoluble in water; and the valerianate of quina fuses into oily globules in boiling water, and dissolves with difficulty. They are both freely soluble in spirit.

2. *The spurious valerianate of iron* is perfectly soluble in water, especially when aided with a little heat; it is insoluble in spirit. *The spurious valerianate of quina* is soluble in about thirty parts of boiling water, and, as the solution cools, it is deposited in acicular crystals, which have the bitter taste and other characters of disulphate of quina.

3. *The true valerianates*, when mixed with a little diluted hydrochloric acid, are decomposed, and the valerianic acid being set free, rises like oil to the surface of the liquid. To get this character it is necessary to operate upon from five to ten grains of the specimen, and to avoid the use of too much of the diluted acid, as valerianic acid is soluble in about thirty parts of water. The liberated valerianic acid has the sour, disagreeable, and very persistent smell, which to a slight extent is perceived in its salts, but it is readily distinguished from that of oil of valerian.

3. *The spurious valerianates*, when added to water, will generally yield a thin film of oil, which floats on the surface, and is easily detected as oil of valerian. On heating the liquid this oil is driven off, without otherwise decomposing the salt, and no further indication of valerian will afterwards be obtained. On treating them with diluted hydrochloric acid there is no valerianic acid set free.

4. *The true valerianates*, when mixed with a little proof spirit, and one-fourth the volume of oil of vitriol is then carefully added, will yield valerianic ether, which is recognised by its agreeable fruity smell, somewhat resembling that of the pine-apple. This ether can hardly be distinguished in smell from butyric ether.

4. *The spurious valerianates* yield no valerianic ether; but the *spurious valerianate of zinc*, when treated as above, yields acetic ether, which is easily detected.

The foregoing tests are sufficient to distinguish the true valerianates from the spurious substitutes above mentioned, but there is reason to believe that other substitutions have been practised, although not so extensively. We have met with a specimen of

so-called valerianate of iron, which is evidently not what its name indicates, and yet it contains neither citrate, tartrate, nor acetate. It is in the form of a brown powder, insoluble in water and in spirit. It smells of valerianic acid, but on being decomposed with hydrochloric or sulphuric acid, yields no appreciable quantity of the oily product. We have not had time to submit this specimen to a careful examination, but it is easily distinguished from the true valerianate of iron by its being insoluble in spirit, while the latter dissolves freely in this menstruum, even without the application of heat. This suspected specimen is also distinguished from the genuine by its behaviour when heated in a platinum crucible.

The true valerianate, if carefully heated, fuses, gives off valerianic acid undecomposed, then as the heat is increased, burns with a luminous flame, and emits a very offensive odour.

The suspected specimen does not fuse or give off any appreciable quantity of valerianic acid. The vapour does not readily inflame, and the odour emitted is not offensive.

The residue of oxide of iron is the same in both specimens, namely, twenty-five per cent., and the acid originally present is organic.

Where mere adulteration is practised, the detection of the fraud is much more difficult than it is in the cases to which we have hitherto alluded, the cupidity of the manufacturer having fortunately, in these cases, blinded his discretion, so that a speedy exposure of the practice was inevitable.

About three years ago, as we find from the *Journal de Pharmacie*, much of the valerianate of zinc met with in Paris was found to have been made with butyric acid, instead of valerianic acid. The butyrate thus substituted was of a more beautiful and crystalline appearance than the true valerianate, but it did not essentially differ in character, and the detection of the fraud, by satisfactory tests, was not easily accomplished. A paper was published on the subject by Messrs. Laroque and Huraut, in which they recommend the use of a concentrated solution of acetate of copper for distinguishing valerianic from butyric acid. In the use of this test, however, it is necessary, in the first place, to eliminate the acid by adding sulphuric acid to the salt and separating the volatile acid by distillation. When butyric acid is added to the concentrated solution of acetate of copper, a bluish white precipitate is immediately formed ; but on adding valerianic acid in like manner, there is no immediate appearance of precipitation or turbidity of the liquid, but on shaking it, oily drops, of a greenish colour, separate, partly rising to the surface and adhering to the sides of the vessel, and partly falling to the bottom. These oily globules consist of anhydrous valerianate of copper, which retains

this condition sometimes for twenty minutes or more, but it ultimately becomes hydrated, and then forms a bluish green crystalline powder.

The greatest possible vigilance and care are requisite on the part of those supplying compounds, such as we are here noticing, for medicinal use. Some of these compounds have been but little studied by Chemists, and the means of distinguishing them by chemical tests is not always complete or satisfactory. If manufacturers are disposed to be dishonest, it is sometimes difficult to detect all their fraudulent practices; and a single individual may thus entail discredit upon hundreds of unconscious dupes, who become the venders or dispensers of spurious or sophisticated articles. The injury thus inflicted on medical science is of a very serious nature, for what becomes of the value of medical experience with reference to the action of remedies, if no dependence can be placed upon their identity? A Physician sees an account of the great benefits which have been derived from the administration of valerianate of zinc or iron in some very troublesome complaints. He prescribes the remedy, but after a lengthened trial finds it to be unavailing, and accordingly he discards it from his Materia Medica, unless, perchance, as in the present instance, it is discovered that the remedy employed was entirely different from that prescribed, and then the dispenser and the wholesale vender are alike involved in the mortification and disgrace of having obstructed the efforts of science to relieve the sufferings of the afflicted. Is it not too often the case that the skill and learning of the Physician are stultified by practices such as it has now been our painful duty to record and to reprobate?

It was but the other day that a case came within our knowledge in which a medical man, being desirous of trying the action of different anæsthetic agents, made a series of experiments with *Dutch liquid*. Having complained of the price charged for the first specimen which he obtained, further supplies were procured from a different source; but after devoting much time to the investigation of the medicinal action of the remedy, with the intention of publishing the results, what must have been his mortification to find that the substance he had used was not Dutch liquid at all, but appeared to be a mixture of chloroform and spirit! The physical characters of chloroform and Dutch liquid are so similar that they cannot be distinguished by taste, smell, or general appearance; and the addition of a little spirit to chloroform, gives to the latter the property of burning, and reduces its specific gravity, so as to assimilate in these respects with Dutch liquid. The fraud was ultimately detected in the case alluded to by mixing some of the spurious article with water, when the spirit was separated, reducing the volume of the liquid to one-half, and this was found to be no longer combustible.

The practice of medicine is either based upon principles which have been established by the careful observation of the action of remedial agents, or it is a system of quackery and deception. Yet it is obvious that all observations must be worse than worthless, and that no step can be taken in the advancement of the science of medicine as a remedial art, unless well defined agents be employed, and their identity be constantly maintained. How great, then, is the responsibility of the dispenser of medicines! How greatly is the Physician dependent upon his intelligence, integrity, and skill!—and how much does it behove the public to require that those who are engaged in the administration of medicine shall be competent for the performance of their responsible duties!

ON A NEW SORT OF BALSAM OF COPAIVA.

BY L. POSSETT.

The different sorts of balsam of copaiva hitherto found in commerce, are characterized by the presence of an acid (an acid resin) copaivic acid, in consequence of which, they, if mixed in proper proportions with solutions of potash or ammonia, form therewith a more or less clear solution, from which in the latter case, crystals of the ammoniacal salt precipitate after some time. If this reaction did not take place, the balsam has hitherto been supposed to be adulterated with fixed oils, turpentine, &c. Recently, however, a balsam has been introduced into commerce, which does not show this reaction, and, notwithstanding, is not adulterated. This sort was imported from London from one of the most respectable firms there, and was accompanied with the assurance that the article was unadulterated, and came from the Brazils. This statement was supported by analysis, and the conclusion to be drawn therefrom is, that some species of Copaifera, or of some allied genus, yields a balsam which possesses great resemblance to the common balsam of copaiva, and yet essentially differs in its nature from it.

The balsam in question is thinner, of a lighter yellow colour than the common kind, so that it is strikingly distinguished from the latter by this character. It possesses the peculiar disagreeable smell of the balsam of copaiva, and the peculiar persistent taste, in perfect purity. The specific gravity is 0.94. Mixed with solutions of potash or ammonia, it remains in all proportions turbid, and never forms a saponaceous mixture with them; after some time it again separates from these liquids. In alcohol it does not perfectly dissolve, which the common kind readily does, but forms with it a milky liquid. This originates from a resin contained in it, which does not dissolve in alcohol. It contains 82 per cent. of oil, and 18 per cent. of resin.

In order to obtain the volatile oil in a pure state, the balsam was distilled with the addition of water. By this process, one part of oil, and about thirty-two parts of water were obtained. The distilled oil was again subjected to distillation with a fresh addition of water, and the thus obtained oil, which was clear like water, was dried by chloride of calcium. It is a thick, colourless oil, of a strong and pure copaiva smell, and of an acrid, burning taste. Its specific gravity is 0.91; the boiling point is at 485° Fahr. The boiling oil readily becomes decomposed by the heat. It assumes a yellowish colour, becomes viscid, then brown, thick, and glutinous, and at last is perfectly decomposed, whilst carbon is separated:

hence the specific gravity of the vapour could not be determined. With ether it can be mixed in all proportions, but not so with absolute alcohol, of which a rather large quantity is required for perfectly dissolving it. In common alcohol it dissolves but with great difficulty ; if dry ammoniacal gas be passed into it, it rapidly absorbs it, and combines with it to form a reddish-brown fluid, which, if saturated, fumes in the air. Neither by leaving it at rest, nor by cooling it, could a crystallizable compound be obtained from this solution.

According to an analysis of this oil, it belongs to the carbo-hydrogen oils free from oxygen, and is composed after the general formula C_{10} H_8. It is distinguished from common oil of copaiva by its viscidity, by its relation to alcohol, to ammoniacal gas, and by its boiling point, and resembles it only by the smell. It may be denominated *Paracopaiva oil.*

Nitric acid of 1.32 specific gravity produces no reaction at common temperatures. If, however, it be heated, a violent reaction takes place, and the oil is converted into a resinous substance. If diluted nitric acid be employed, the mixture boils quietly, without boiling over, and within a few days the oil dissolves perfectly in the liquid. At the same time, nitrous acid, carbonic acid, and volatile peculiar acids are eliminated, which form with acetate of lead a precipitate, but which have not been further examined. The residue being evaporated and diluted with water, yields an acid resin (not affected by nitric acid) and a crystallizable acid, which remains in solution, whilst the former is precipitated. This resin is of a yellowish-red colour, dissolves in some degree in boiling water, and forms again a milky precipitate when cold. In ether and alcohol it dissolves with facility, and from the alcoholic solution small resinous crystals are afterwards precipitated. It has a strong acid reaction, and forms with potash or ammonia, red neutral compounds, which are soluble in water.

The acid which is obtained after the evaporated nitric solution of the oil has been freed from the resin just described, by the admixture of water, crystallizes in thin, transparent, colourless laminæ, It dissolves easily in water, spirit of wine, ether, and petroleum—is inodorous and bitter ; and has a slight acid reaction. Although a great quantity of volatile oil had been employed, only a small quantity of acid was obtained, which was not sufficient for further experiments.

Fuming nitric acid detonates with the paracopaiva oil without the application of heat ; iodine, however, is dissolved by it, without effecting any violent reaction. Chlorine produces violent reaction, vapours of muriatic acid gas escape, and the mass becomes yellow and viscid ; oil of vitriol produces a deep violet colour.

The difference between the resins of the two sorts of balsam of copaiva is still greater than that between the volatile oils.

In order to obtain the resins in a pure state, the balsam, which had been freed by distillation with water from the greatest part of the volatile oil, was still further boiled with water, till at last every trace of smell had disappeared. A light brown, brittle resin remained behind, which consisted of two distinct resins, but both absolutely indifferent. They can easily be separated from one another by alcohol, in which the one dissolves with great facility, whilst the other scarcely dissolves even when the alcohol is absolute and hot.

The *resin soluble in alcohol* constitutes the greater proportion, and can be obtained in a pure state by repeated solution in alcohol ; the other resin wholly remains behind. It is of a light yellow colour, not friable in the cold, softens at a gentle heat, and is decomposed if the temperature be slightly increased ; at the same time it assumes a deeper colour, and becomes a viscid fluid. In weak boiling spirit it dissolves, but precipitates again for the most part in the cold, in the form of white flakes. In strong alcohol

it readily dissolves also in the cold, equally so in ether and petroleum. The alcoholic solution has no acid reaction, and if left at rest, the resin precipitates in proportion as the alcohol evaporates, in small drops, which betray no trace of a crystalline texture. With acetate of copper no precipitate is formed; in solutions of potash or ammonia it does not dissolve.

Two analyses gave the following results :—

Carbon	59.98	.....	60.06
Hydrogen	8.48	.....	8.27
Oxygen.....	31.54	.....	31.67
	100.00		100.00

The *resin insoluble in alcohol* remains behind after the preparation of the first. It should be boiled several times more in absolute alcohol, in order to obtain it perfectly pure. During this process, its quantity considerably diminishes; it is then to be dissolved in ether, the ethereal solution filtered and heated for some time on the water-bath, in order to expel the last traces of ether.

It possesses the same colour as the first, does not dissolve in diluted alcohol, dissolves with difficulty in boiling absolute alcohol, and when cold, again precipitates, for the most part, from this solution. In ether and petroleum it easily dissolves. The solution has not an acid reaction, and no crystals could be obtained from it. In a solution of potash or ammonia it is perfectly insoluble; if boiled with it, it forms a milky turbid mixture; the resin precipitates, however, perfectly again, when at rest. With acetate of copper a slight precipitate is formed. It melts with difficulty.

The elementary analysis of two samples prepared in different ways, gave the following result :—

Carbon	81.76	.....	82.12
Hydrogen	10.56	.....	10.48
Oxygen	7.68	.....	7.4
	100.00		100.00

The combustions were performed with oxide of copper and chlorate of potash, for without the addition of the latter, no perfect combustion could be effected.—*Ann. der Chemie und Pharm.*, lxix.

ON THE PRODUCTION OF ARTIFICIAL OIL OF RUE FROM COD-LIVER OIL.

BY DR. RUDOLPH WAGNER.

It is well-known that cod-liver oil, when mixed with strong sulphuric acid, furnishes at first a purple-red tenacious mass, which colour almost immediately passes into a brownish-red, and then into a dark brown. If this mass is supersaturated with a caustic or carbonated alkali or an alkaline earth, and then heated, a penetrating odour of the essential oil of rue (*Ruta graveolens*) is disengaged. To procure the odoriferous substance in sufficient quantity for analysis, I mixed pretty considerable quantities of cod-liver oil and sulphuric acid, then saturated with potash or lime and distilled with water. The water which passed over was turbid, and possessed an excessively strong odour of rue; but only in a few cases was I able to perceive any drops of oil upon its surface. Other experiments, in which I treated the fatty acids separated from the saponified cod-liver oil in a similar manner, furnished no better results. Fish oil and train oil, from train-oil soap, submitted to a similar treatment, furnished the same result.

I am not able to state more of the oil obtained, than that it is of a light yellow colour, lighter than water, boils about 572°, and possesses the pure odour of the oil. With respect to the remarkable production of this oil from train oil by the action of sulphuric acid and subsequent saturation with a base, I may observe, that it certainly exists as such in the train oil, and cannot be considered as a product of decomposition by sulphuric acid. I found amongst the volatile fatty acids of cod-liver oil, butyric and capric acids. Now if we bear in mind that Gerhardt has recently asserted that the oil of rue is the aldehyde of capric acid, $C_{20}\ H_{20}\ O_2$, which he rendered probable by converting it by treatment with nitric acid into a different acid of the formula $(C_2\ H_2)\ n + 4\ O$, pelargonic acid, we may be allowed to conclude that the sulphuric acid enters into a combination with the aldehyde of capric acid, or rather with the oxide of caprinyle, $C_{20}\ H_{19}\ O$, and that this compound is decomposed on the addition of a base, when aldehyde separates. This aldehyde, on becoming rancid, that is, by the absorption of two equivalents of oxygen, forms capric acid, $C_{20}\ H_{19}\ O_3 + HO$. That the latter does not give rise to the production of the oil of rue, is shown from the fact that the capric acid is not at all altered by mixture with sulphuric acid.

The characteristic odour of the oil of rue, or of the aldehyde of capric acid, furnishes us with the means of detecting the presence of capric acid, or rather of the aldehyde, which always accompanies it. For instance, when fresh butter is heated with concentrated sulphuric acid, and potash is added in excess to the melted brown-red mass, the odour of the oil of rue is distinctly perceptible amidst the penetrating odours of the volatile fatty acids contained in the butter. I obtained the same odour by submitting to a similar treatment various sorts of fish oil, a piece of herring, several kinds of cheese, &c.

I will mention, in conclusion, that a mixture of train oil and sulphuric acid saturated with lime having been kept several days before distillation, the distillate consisted of a turbid water, which no longer possessed the odour of oil of rue, but very distinctly that of peppermint. This circumstance is interesting on account of the isomerism of the oil of rue with the camphor of the oil of peppermint.—*Journ. für Prakt. Chem.*, xlvi. p. 155.

METHOD OF TAKING IMPRESSIONS OF LEAVES.

TO THE EDITOR OF THE PHARMACEUTICAL JOURNAL.

Dear Sir,—Amongst your Answers to Correspondents last month, I see there is a question as to the best method of taking impressions from leaves; as you say in your answer, it is not mentioned on what material, but should it be paper, I can confidently recommend the following process: I am not aware whether it is generally known, if not, I think many of your botanical students would prize it highly:—

Take a piece of camphor (the size varying of course according to the quantity of ink required) burn it under a gallipot or some glazed vessel, and mix the product of combustion thus obtained, with a sufficient quantity of Ol. Ol. Opt. to form a very thick ink, about the consistence of such as printers use. The ink being thus prepared, lay with a camel's hair brush a very thin coating (the thinner the better, so long as the paper is perfectly covered) upon a piece of paper; unglazed white demy I generally find answers very well, as it absorbs any superfluous oil there may be in the ink. Now lay the leaf on the inked paper, cover with another piece of clean paper, and then with a soft cloth, apply gentle but even pressure, remove the leaf, and place it very carefully on the sheet of paper on which you wish to receive the impression, cover, and apply pressure as before.

By this process I have taken impressions of leaves almost equal to copper-plate, with the advantage of being very inexpensive, and at the same time perfectly natural. I remain, dear Sir, yours respectfully,

J. Clift.

IMPRESSIONS OF LEAVES.

In a late number, a correspondent inquires "by what means he may obtain skeleton leaves, retaining their beautiful network?" Unless he wishes to preserve the tissue of the leaf itself, an impression may be taken by which every vein is perfectly delineated with little trouble, and answering every purpose of the leaf itself. Procure a small quantity of boiled linseed oil, some very finely powdered lamp-black (if the impressions are required in black), or any other finely powdered colouring material, as vermilion or indigo, according to taste, and mix these with the oil so as to cause it to assume the consistency of cream. Two flat leather balls, about the size of the hand, will be required; these should be made of wash-leather, and stuffed with wool. The balls are then slightly smeared with the ink, and rubbed one against the other, adding a little ink repeatedly, so as to obtain by friction a nice smooth surface on each ball, which is requisite at first in order to get them into good working order; then having the ball held in the left hand slightly moistened with the ink and well rubbed, lay the leaf of which you want an impression on it, give a smart blow with the ball held in the right hand so as to ink the leaf, then place the latter inside a sheet of note paper, lay on a sheet of blotting paper, press it down, and the result will be, with a little care and practice, an impression as perfect as the skeleton leaf itself, and after the first time with very little trouble. By placing the leaves inside the paper, impressions of both the under and upper surfaces are taken at once.—*J. H., Feb.* 28.—*Gardeners' Chronicle.*

THE APOTHECARIES' COMPANY NONSUITED.

COUNTY COURT, WATFORD, MONDAY, MAY 14.

Before J. H. Koe, Esq., Q.C.

The Masters, Wardens, and Society of the Art and Mystery of Apothecaries of the City of London v. *E. H. C. Kelly, Esq. M.D.*—Counsel for the plaintiffs, Mr. Atkinson; solicitor, Mr. Rowell, of Rickmansworth. The defendant was represented by Mr. Frederick Day, of Hemel Hempstead, solicitor, and Mr. Frederick Asprey, of Furnival's Inn, London, solicitor. The case excited great interest in the town and neighbourhood, and the Court was densely crowded during the trial; all the leading members of the medical profession in this part of the county appeared to be present.

This action was brought to recover a penalty of £20 for an alleged infringement of the 20th section of the Apothecaries' Act, the 53d Geo. III. c. 194.

Before the learned counsel opened the plaintiffs' case, several objections were taken on the part of the defendant to the cause proceeding. First, to the jurisdiction of the County Court in this particular case, on the ground that it was an action to recover a penalty, and the informer was entitled to half the amount in case of conviction, and therefore the County Court Act did not embrace this description of action. Secondly, that the action was not rightly brought; it being instituted in *tort*, which implies some act done in the nature of trespass, and such actions being brought to recover unliquidated damages for a personal wrong, whereas the present action was brought to recover a penalty of £20. As this was a certain sum, it was contended that the present case did not come under the de-

scription of actions called actions of *tort*. And, thirdly, that the plaintiffs did not disclose any ground of action for assuming that the defendant had done all that was charged against him, and even then that he would not be liable to the penalty in question. These points were very ably argued at great length on the defendant's behalf, and an appeal made to the learned Judge to nonsuit the plaintiffs ; but, after hearing the counsel in reply, the Judge declined to stop the case. Notes of the several objections were, however, taken by the Judge, and the case proceeded.

The learned counsel, in his opening speech to the jury, stated that this was an action brought against the defendant, who was described as a gentleman residing at Pinner, of acknowledged ability in his profession, and duly qualified to practise as a physician and surgeon. Not the slightest imputation was attempted to be cast upon the defendant in his professional character ; but nevertheless the Apothecaries' Company have thought it their duty to bring forward the present case against the defendant, who has been practising as an apothecary without having obtained the required certificate, as directed by the Act of Parliament. Mr. Atkinson then proceeded to describe the difference between the duties of a physician and surgeon, and those of an apothecary, and admitted that the defendant had a perfect right to practise as the former, but not in the latter character. He had, however, practised as an apothecary, and hence his liability to the penalty in question. Mr. A. then referred to the charge in question, and went on to state that the complaint in the present case was, that the defendant "had acted and practised as an apothecary (to wit) at Pinner, by then and there acting as such apothecary, in attending, advising, furnishing and supplying medicines to and for the use of one James Hedges, and others," without having obtained such certificate as by the Act is required. "Now," continued the learned counsel, "I shall prove, if I am properly instructed, that the duties of an apothecary are, to prepare with exactness, and to dispense such medicines as may be directed for the sick by any physician lawfully licensed. While, therefore, the defendant confined his practice to prescribing, no charge could be made against him for a violation of the Apothecaries Act; but I shall prove by the clearest evidence that in the present case the defendant has not only attended patients and prescribed for them, but likewise furnished them with medicines, and that, therefore, he is liable to the penalty now sought to be recovered. The learned counsel then called the following witnesses :

Mary Leach said—I am a widow, and know Dr. Kelly, the defendant. He attended my husband several times before his death, which took place on the 26th of June last. The defendant said he would not pick my pocket, but would do all he could as a friend. He gave me something in bottles for his cough. He sent me four or five bottles. I have not paid the doctor anything.

Cross-examined—The medicines sent by the doctor were only for my husband's cough. I know Mr. Haynes, who has called upon me about this case. I do not know that he is the informer.

Thomas Graves examined—I am nephew to Mrs. Leach, the last witness. I have been to the defendant's house for medicines, and he gave me some medicine out of a bottle. I only went once for medicine for my master, who was ill about two months.

Cross-examined—I don't know what the medicine was that was given to me.

James Hedges said—I am a farmer, living at Pinner. I am a member of the "United Brethren Society," and have belonged to the club 20 years. I had a cold last November: I was not attended by the doctor at all. I went to the defendant's house, but did not see him. He is the doctor to our club. I have paid no money to the club.

Cross-examined—Mr. Kelly said, "I will give you something for your cold." I know Mr. Haynes, he has called on me about this case.

Thomas Tull examined—I am a shoemaker, residing at Pinner, and Secretary to the "United Brethren Society." There is an agreement about a doctor in our club—(the subscription was here produced and read), I had some conversation with the defendant last year. I said it was necessary to have a doctor in our club, and that he, the defendant, had been appointed by the members. He said he would prefer being paid a certain sum per year. We talked the matter over, and agreed to pay him 4*s.* per annum each member. I saw defendant again, and left a copy of our club-book with him. I paid the money for each member to the Treasurer. I have not seen the defendant attend any case.

Cross-examined—I have not paid the defendant any money on account of the club. He has not supplied any of the members with medicines that I am aware of. I know Mr. Haynes, but cannot say whether he is the informer. I have seen him about this matter. I see him now in Court. The witness was requested to point out Mr. Haynes in court, and he did so.

This closed the plaintiffs' case.

It was then submitted on the part of the defendant, that the plaintiffs had entirely failed in making out any case whatever to go to the jury; and, on the learned Judge quite concurring in this opinion, the plaintiffs were nonsuited. Whilst the Judge was making some observations on the vagueness of the evidence produced on the part of the plaintiffs, one of the jury stated that they were quite prepared to return a verdict for the defendant; but no case having been made out for their consideration, a nonsuit was the consequence.

SANITARY PROSECUTION.

At the Worship Street Court on Thursday, Messrs. Heathfield and Burgess, Experimental Chemists, &c., in Princes Square, Finsbury, were summoned before Mr. Hamill, under the Sanitary Act, for causing a nuisance to the public health.

Mr. John Letchmore, an inspector under the Act, stated that he visited the defendants' premises, and found a most offensive effluvium from the gratings of the drain, the result of distillation from naphtha, and the same nuisance he believed still existed.

The defendants admitted that such an effluvium had existed three weeks previously, but alleged they had since endeavoured to obviate it; but Mr. S. Whitaker, inspector of nuisances in Shoreditch parish, proved that on the previous day the same effluvium arose from the drains. He had seen a whitish vapour arise from the drain, producing unpleasant and stupifying effects on himself, and he knew that it had produced a similar effect on the persons residing near the premises, and in the courts through which the drains passed.

Mrs. Jane Martin, who lives close to the defendants' premises, said that the vapour rose to her room, causing a most nauseous smell, and injuring the health of herself and children. It affected their breath and chest, producing headache, nausea, and loss of appetite. The children especially suffered, but she thought it was not quite as bad as before.

Mr. G. J. Peres, whose house is in Horseshoe-alley, within two yards of the premises, said that he and his wife had suffered much from the effluvium. He felt an oppression in his chest, heaviness in his head, and a loathing of food. He was obliged to leave off work, and felt ill for three or four days.

Richard Peres, father of the preceding witness, corroborated the son's evidence. His daughter died of consumption on Tuesday, and shortly before her death complained of the taste of naphtha in her mouth. Her

disease was consumption, aggravated, he believed, by the effluvium in question.

Mr. Frederick Ingleby, a medical man, of Finsbury Square, said that the effects of the effluvium would be such as the witnesses described. It was dangerous to the health of any person living within its influence.

The magistrate said he felt bound to make a peremptory order that the nuisance be removed within forty-eight hours.

A CAUTION TO CHEMISTS.

Several correspondents have applied to us recently as well as on former occasions, for advice in reference to misunderstandings with persons introducing new articles, and furnishing the first order on sale or return, or other special conditions. It has sometimes occurred, that the purchaser having bought the goods under the impression that he was incurring no risk, finds, in the course of a few months, that the whole are on his hands, and that by not returning them before a particular day, he has forfeited the privilege. We have known cases in which the orders have been almost forced upon the purchasers, or the goods sent without any positive order, and yet it has been difficult to make a defence, for want of legal evidence of the real nature of the transaction.

The most recent cases referred to us, are misunderstandings for want of a written agreement, comprising all the conditions. In one case, the signature of a Chemist was obtained on a blank order, under the pretence that the traveller would inquire whether his employers would send the goods on sale or return, the party refusing to take them on any other terms. Some goods were sent without this condition, and returned in consequence. A correspondence ensued, but the vendors held the party to his agreement, not admitting his plea that the signature was given conditionally *on a blank order*, pending an inquiry. In another case, a special condition was entered into by the traveller, but not written on the order. The condition being violated, the goods were returned. But a random shot from a lawyer brought down the victim, and the money was paid with costs to save further trouble.

Now these misunderstandings and losses (of which the above are only a few instances by way of example) might easily be avoided by taking the precaution to place all the particulars of the agreement in writing, each party keeping a copy attested by an impartial witness. With some persons a word is as good as a bond ; in the case of others, a bond is preferable. In dealing with strangers, it is better always to have a written agreement, and especially where the parties are strict disciplinarians in their method of transacting business.

For example, Messrs. Williams and Co., of 19, Broad Street Buildings, who have recently introduced some proprietary nostrums, have a notice on their order-paper, to the effect that goods are not sent on sale or return, and that the travellers have no authority to take orders on other conditions than those expressed on the face of the order. Now, in this case, reliance should not be placed on any conditions proposed or assented to by the traveller, unless written on the order, and signed by him in the presence of a witness. Those who neglect this precaution, must be prepared for a shot in the course of three months. It is of course optional with persons in business, to adopt the sharp or the mild practice, according to their taste or humour. Some find it policy to win the confidence and good opinion of their customers by civility and an accommodating disposition. Others act according to law, which is as the laws of the Medes and Persians, and insist upon having "the pound of flesh." In dealing with persons of this latter class, we advise our readers to be on their guard, and see that the "bond" is explicit and properly attested.

OBITUARY.

MEMOIR OF JOHN BELL.

[The Editor feeling some delicacy in publishing this Memoir of his Father in the *Pharmaceutical Journal*, thinks it right to state that it was undertaken at the suggestion of several Members of the Society, who considered that an account of the early life of a Chemist who had been above half a century in the business, might be instructing as well as useful, being, in the present instance, a practical illustration of the result of a strict adherence to conscientious principle, even under apparently unfavourable circumstances. The great difficulties he had to contend with in the commencement, which were increased by his natural caution and want of confidence in himself, may serve as an encouragement to young men under similar circumstances. The hope that this may be the case furnished a strong inducement to publish the Memoir.]

John Bell was the second son of Jacob Bell, who was a mast-maker, in partnership with his brother-in-law, James Sheppard, at Wapping Wall. Prior to the American war, their business flourished, but when the war commenced, they became uneasy at furnishing materials for a purpose so much at variance with their principles as members of the Society of Friends. Jacob Bell withdrew from the concern, and became a hosier, in which business he was less successful.

John Bell, the second son, was born on Fish Street Hill, on the 4th of December, 1774, and received his early education under Thomas Coar, who was a good classical scholar, and kept a school at Tottenham. On leaving school, he was apprenticed to Frederick Smith, of 29, Haymarket, Chemist, as a preliminary step to his education as a Physician, for which profession his father intended him. During his apprenticeship, he attended the lectures of Dr. Pearson on Chemistry, Materia Medica, and the Practice of Physic, and subsequently Dr. Hooper's lectures, which were delivered in Blenheim Street, on the premises of Joshua Brookes, the Surgeon. He was diligent in attending the lectures, some of which were delivered at seven o'clock in the morning, and in other respects exerted himself in gaining information, although his opportunities were very limited. During his apprenticeship, his allowance of pocket-money was only one shilling a week, and this he expended chiefly in books and chemical apparatus, of course on a very small scale.

He soon abandoned the idea of following the medical profession, for which he considered himself not fitted on account of his natural diffidence and nervous temperament. On his first attempt at bleeding a patient, his hand trembled, and he was so nervous that he with difficulty accomplished it, and did not attempt the operation a second time. He also objected to the medical profession on the ground that it would (to use his own expression) "expose him too much to the temptations of the world," during his probation as a medical student, as well as in the ordinary requirements of medical practice. The reduced circumstances of his father afforded an additional argument in favour of another avocation less expensive in its commencement.

He therefore decided upon commencing business in a small way as a Chemist and Druggist, and after the expiration of his apprenticeship, he continued for some months to serve as an assistant, while looking

out for an opening, the accommodation being considered an equivalent for his services. He afterwards received a small salary.

The fragment of a journal which he kept in the year 1797, is characteristic of the peculiar constitution of his mind, which was very unlike that of most young men of his age. His chief desire appeared to be to escape "the snares and temptations of the world," and to adhere strictly to the path of duty. He was conscious of a natural irritability of temper, which it was his constant endeavour to subdue, although he frequently alludes to the extreme difficulty in attaining his object; and his occasional despondency and contrition almost amounted to a state of religious melancholy. One incident will serve to show the extent of these conscientious feelings:—Finding money unaccounted for in the till, he entered the amount as for goods sold, in making up his account, to make it balance, instead of acknowledging his forgetfulness. On reflection, this occasioned so much "distress and trouble," that it was several days before he could perform his duties calmly and with any degree of satisfaction, so great was his uneasiness at the idea of the occurrence of a mistake in the money.

On the 17th of August, he observed a shop to let in Oxford Street, to which he alludes as follows:—

"Observed, on my return home from seeing a poor woman, a shop to let, which seems a little to strike me, though with a fear lest I should err in judgment. It would truly be considered a peculiar favour to be rightly directed so as to have peace and confidence afterwards, as with a superior licence in a matter of so great importance in knowing the right place. This must all be left, as I have never wanted yet, and if I may be so favoured as to keep my place, however unworthy, will not an allwise bountiful Providence care for me? How is it with the sparrows and the lilies? though, truly, can I have so great a right as they, since they have never sinned like me?"

On several other occasions he alludes to his doubts and misgivings respecting "that shop in Oxford Street," which he seemed unable to abandon, and yet had not resolution or confidence to come to a decision. One ground of hesitation arose from delicacy of feeling towards his master, to whom he was desirous of acting with strict honour, and avoiding the possibility of any jealousy or distrust, by commencing business too near the old shop. His employer, however, not only gave him full permission, but encouraged him to proceed; and his father ultimately settled the question by taking the shop for him, and lent him £400 to prepare and stock it. The fitting-up order for drugs was executed by Messrs. Fynmore and Palmer, on the 24th of November, 1798, and amounted to £86 13*s.* 9½*d.*

There was at that time only one Chemist's shop in Oxford Street, which was situated at the west corner of Argyll Street, now the Green Man and Still. This establishment was celebrated for the fabrication of cheap powders, which were ground and prepared in a mill at the top of the house; and the character of the business in other respects was not of a high order. The custom of adulterating medicines was so prevalent, that even at houses considered above the average in respectability, various practices were carried on which occasioned much uneasiness to the subject of this memoir. He has frequently been heard to mention the fact that, during his apprenticeship, he was employed to pound many hundred-weights of glauber salts, which

were sold as nitre for horses. Red precipitate was mixed with red lead, and there was a small room almost exclusively used for "russifying" rhubarb. This process consisted in cutting and filing East Indian, to imitate Turkey, rhubarb. In reference to horse powders,it was customary to keep two kinds, the "genuine" and the "compound," which latter were prepared by sending 14lbs. of the article to the mill and receiving in return 28lbs., sometimes even a larger quantity, no questions being asked as to the mode in which the quantity had been increased. These and other similar practices being too general to excite any attention, they were not entirely absent even in the establishment of a man who was, in other respects, remarkably concientious and scrupulous, which the following fact will serve to show :—Before embarking in business as a Chemist, Frederick Smith held for many years a lucrative situation in the Post Office. His salary had been gradually raised until it amounted to nearly £1000 a year, and was likely to be further advanced. It happened, however, that he was sometimes called upon to give evidence in cases of robbery, which was at that time a capital offence. Becoming impressed with a religious scruple against taking an oath, and also against capital punishments, this duty was a source of great uneasiness, which increased to such a degree that he at length declined to comply when called upon to give evidence. By this means he lost his situation in the year 1783, and finding the business for sale in the Haymarket, he became a Chemist and Druggist. Not having been educated to the business, he carried it on for some time in the same manner in which it had been conducted by his predecessor. When he became more acquainted with the business, he gradually discontinued these practices, and was afterwards very particular in the quality of his drugs. The circumstance serves to illustrate the impropriety of persons embarking in a business of that kind, without understanding the fundamental principles on which it should be conducted. John Bell, having during his apprenticeship seriously considered this subject, resolved that, as soon as he became a free agent in the management of a business, he would adopt a different principle, selling the best medicines he could procure. In this experiment he occasionally had some misgivings, from doubts arising whether it would be possible to carry out to the full extent what he considered to be the principles of strict honesty. He was, however, encouraged by his younger brother Jacob Bell, who assisted him at the commencement, and who maintained without flinching that it was not only possible, but expedient as a matter of policy, to defy competition in price, and make the quality of the medicines the primary consideration.

Towards the end of 1798, John Bell opened his shop. On the first day his receipts amounted to ten shillings, and he lost half-a-guinea by the following accident :—A customer who came in for some trifling article, wanted change for half-a-guinea. This was rather a large sum to raise so soon after opening the shop, and Mr. Bell had occasion to search his pockets, as well as a drawer in the counting-house, in order to find the amount. The customer observing the difficulty, said it was of no consequence, as he had some change. Just at this moment the amount of change was collected and laid on the counter, on which he said, that as it was there he would take it. But he had already put the half-guinea in his pocket, taking up the change, he went off with both, the young Chemist being so bewildered that he was not

aware of the fact until several minutes afterwards. This mishap discouraged him so much that he despaired of success altogether, considering it a proof of his incapacity to "cope with the world," or manage a business on his own account.

So complete was his despondency at the supposed hoplessness of his case, that he did not think it worth while to light the lamps in the evening. A neighbour, who had taken a kind interest in his proceedings, observing the shop dark, came in to inquire the reason, and on being informed, used all his endeavours to dispel these gloomy ideas, declaring that he would light the lamps himself rather than allow his friend to be overcome by such a trifle. This was all to no purpose, and in the morning the young Chemist went to his uncle Sheppard, who had acted like a second father to him on previous occasions, and informed him of the determination at which he had arrived to dispose of the shop as it stood, before he had made his position still worse by becoming involved in debt. He mentioned as an additional source of discouragement, that he had been so cramped for want of capital that he had not been able to complete the arrangements of the shop to his satisfaction, and that it would cost at least £100 to remove a partition, and add what was requisite for the convenience of business. He thought, as the situation was good, that a purchaser might be found having the capital required, who would take the concern off his hands and thus enable him to pay 20*s*. in the pound; and said he would rather continue in the capacity of an assistant all his life, than continue in business at the risk of his creditors, with the prospect which stared him in the face of becoming a defaulter.

His uncle, as he had previously done, encouraged him by all means to proceed—endeavoured to convince him that the evils which he apprehended were imaginary—assured him that he had a good prospect of success if he would only persevere, and insisted on his taking a loan of £100 to defray the expense of the desired additions to his shop. By these substantial and irresistible arguments, he was induced to give the business another trial; and his uncle from time to time called upon him, giving him that encouragement of which he seemed so much in need. He observed the most rigid economy in his manner of living, let the house to lodgers except the attics, which he retained as bedrooms, and the back kitchen, where he took his meals. Throughout the winter he did not treat himself with a fire in the counting-house, except on the coldest days, and then only in the evening.

His returns, in the first instance, were extremely small, sometimes not more than three or four shillings a day; but he was assiduous in his attention to business, being constantly behind the counter, and his brother, although young, soon became a valuable auxiliary. He did not profess to be an operative or analytical Chemist, but confined his attention to the retail and dispensing business, and adopted certain fixed principles to which he rigidly adhered, as being at the same time in accordance with his conscientious feelings, and calculated to gain the confidence of the public.

At the end of the first year he made a careful investigation of his accounts, in which he was assisted by his uncle Sheppard, and found that he had lost money, being in a worse position than he was at the commencement. It became a serious question whether it was prudent to continue the business; but having calculated that his loss dur-

ing the year scarcely exceeded the amount of his housekeeping expenses, and being encouraged by his friends to proceed, he followed this advice.

During the second year the business improved considerably, and soon afterwards he was enabled to pay off the capital which he had borrowed from his father and uncle. In the winter of 1800 he took Thomas Zachary as an apprentice, who subsequently became one of his partners.

In the year 1802, John Bell married the eldest daughter of Frederick Smith, his late master. He continued for some years to devote unremitted personal attention to his business, which increased beyond his expectations. He never solicited business, or courted the patronage of the profession, and was not ambitious of extending his connection among the higher circles of society. To the poor he was always attentive, and it was a favourite remark with him that he often had "twelve customers for a shilling." Without any attempt on his part to encourage counter practice, he was frequently applied to by the poor for advice in trifling cases; and, much against his inclination, he acquired some little repute as a doctor among that class of customers. This, however, was rather in the way of charity than regular business, as he had a great dislike to the responsibility of giving advice. There was at that time no law to prevent his practising as an Apothecary, the Act of 1815 not having been passed until several years afterwards. But he never asserted his right to the privilege of an "Apothecary before the Act," as he disclaimed any pretensions to medical qualification, having from choice adopted the business of a Chemist, and devoting his chief attention to the prescription department. His brother Jacob, who came originally as an apprentice, rather expected to have been taken into partnership, but in this he was disappointed, and accordingly contemplated establishing himself in business in some other part of London. Before putting his intention into practice he was taken ill, and died of consumption in October, 1805.

Thomas Zachary's apprenticeship ended in 1806. By that time the number of hands employed was two shopmen and three apprentices. It was soon afterwards requisite to sacrifice the private door in order to enlarge the shop.

Although diligent and regular in his attention to business, John Bell did not allow this to interfere with his religious duties. He always kept the shop entirely closed on Sundays, one assistant being on duty in the morning and two during the remainder of the day to attend to such business as came in, which was sometimes as much as that number could accomplish. He also kept the shop closed on Thursday morning until past twelve o'clock, in order to allow the young men (except those on duty) to attend meeting. The assistants at the time to which we allude were, like their master, Members of the Society of Friends, and the above custom was instituted under a sense of duty. It was, however, attended with much inconvenience and mortification, as it gave rise to a constant report that Mr. Bell was dead, and the young men left in charge on those occasions had enough to do to answer inquiries on this subject. The practice was, however, continued for many years, until the active management came into other hands.

In the domestic regulations of the establishment he was remarkably strict, prohibited the assistants from going out in the evening under any pretence without express permission, and would not allow any deviation from the rules and regulations which were drawn up in writing. Notwithstanding this adherence to discipline, he was generally on the best terms with his assistants while in his employment, as well as afterwards. In taking apprentices, he was never tempted by a high premium, and, in fact, rather preferred those who had nothing to pay, under the idea that he was rendering them the greater service, and that they would be more likely to prove docile and tractable. In this he was sometimes disappointed. One young man whom he had taken under these circumstances was refractory, and when he was out of his time, he started an opposition shop in the same street. The front was in imitation of that of his late master—"John Bell" over the door, with a small "from,"—"house Bell" on one door-post, and "shop Bell" on the other. The imitation was so good, that Mrs. Sheppard, the wife of the kind uncle, who came one evening to tea, having directed the coachman to drive to John Bell's, was taken to the wrong shop, and discovered her mistake when on the staircase, from the young man inquiring where she was going, and what was her business. She replied that she had come to her nephew, John Bell's, to tea; on which he explained—"This is *from* John Bell's; the other shop is a few doors higher up."

In the year 1819, John Bell found it requisite to obtain some relief from the confinement of business, much of his time being required for other engagements, in which he felt it to be his duty to occupy himself. Accordingly, he took into partnership Thomas Zachary and John H. Walduck, who had previously been his apprentices.

From this time, the senior partner gradually relaxed in his business exertions, and devoted much of his time to benevolent and charitable objects, especially in connexion with the Society of Friends.

John Bell was always disposed to unite with his brethren in any movement which circumstances rendered necessary for the benefit of the trade, as, for instance, in reference to the Stamp and Excise Acts, or any threatened legislative measures of an obnoxious character; but he never took a prominent part, and from his natural diffidence, was not active in public business. When the Pharmaceutical Society was proposed, he approved of its objects, but was not sanguine as to the result, his past experience having led to a belief that the Chemists were not likely to "pull together" for any length of time. He took a lively interest in the proceedings of the Society, attended several of the early meetings, and was agreeably surprised at the continued prosperity of the Institution.

In the year 1839 he had the misfortune to lose his wife, and this calamity occasioned a shock from which he never entirely recovered.

About this period, his attention was directed to the subject of intemperance, and its lamentable effects on the lower classes. Being in the habit of distributing tracts to the poor in favour of total abstinence, he considered it his duty to try the experiment himself, by way of example. He had always been remarkable for temperate habits, although accustomed to take beer or wine in moderation; and in adopting the principle of abstinence he took no pledge, but simply tried the experiment, in which he persevered for about seven years.

During this time his health was not uniformly good. He occasionally suffered from languor and a sluggish circulation, and he was advised to try the effect of a more stimulating regimen. For some time he was unwilling to deviate from his abstinent resolve, but Dr. Wilson, who seconded Dr. Hodgkin in this advice, suggested a plan which overcame the scruple. The wine was put up in two-ounce bottles, and sent from the shop as a medicine. Finding the effect beneficial, he afterwards submitted, under medical orders, to take a glass of wine in the usual way. During the last year of his life, the infirmities of age gradually increased, he nearly lost his sight, his strength failed, and he complained of want of circulation, especially in the lower extremities.

On the 10th of December, a sore place was observed in one foot, which terminated in mortification in the course of a month. During this period he was confined to his room, and was fully aware of the serious nature of his disorder. Yet he was patient and cheerful, appeared to feel no regret on leaving this world, nor any dread at the approach of death. He expressed much thankfulness for all the mercies he had received during his life, and full confidence that he should be equally favoured to the end. He retained the possession of his mental faculties to the last, and in taking leave of his family his only anxiety appeared to be on their account: with regard to himself he was calm and resigned, and his constitutional nervous timidity, which had been his constant companion through life, forsook him at the hour of death.

He died at his residence at Wandsworth, on the 14th of January, in his 75th year.

BOOKS RECEIVED.

Reports *of the* Royal College of Chemistry, and Researches *conducted in the Laboratories, in the Years* 1845, 46, 47. London, 8vo, pp. 270.

To be noticed next month.

Outlines of Qualitative Analysis: *for the Guidance of Students of Chemistry.* By Dr. Sheridan Muspratt, Professor to the Liverpool College of Chemistry, &c., &c. Taylor, Walton, and Maberley.

This is the text book for the students in the above College, an institution founded on the plan of the Royal College of Chemistry, London, and one which we are glad to hear is flourishing, and exciting no small degree of interest in its locality. It is satisfactory to observe the extension of chemical science in this country, and the recognition of this useful branch of knowledge as a means of promoting the arts and manufactures. A striking illustration of the fact is furnished in the establishment and success of institutions of this kind in the large provincial towns, where a disposition prevails to follow the example of the Chemists in the metropolis.

TO CORRESPONDENTS.

A.Z.—Hydrochloric acid is the test for silver, the white curdy precipitate formed being insoluble in nitric acid.

J.H.W. (Ipswich).—Pumice stone is not uniform in composition, but usually contains silica, alumina, oxide of iron, potash, and lime.—(2). *Chondrus crispus* is the botanical name for Carrageen moss.

A Chemist's Assistant (Guildford) wishes for formulæ for making essence of hovenia, patchouli, &c.

A Member of the P.S.—Cadmium and mercury may be combined by adding the latter to the fused cadmium.

Quæsitor.—Tannic acid.

W.S.—Animalculæ cages are often used for viewing small insects under the microscope.

N.W.B.—Formulæ for show colours for shop windows will be found in vol. iii, pp. 94, 143, and 192, and vol. vi, p. 391.

Amator Scientiæ.—(1.) We have not seen the apparatus described. (2.) Yes.

A Subscriber.—(1.) The covered copper wire, which is used in some electrical experiments, is generally prepared by twisting cotton round it. (2.) Zinc plates are amalgamated by dipping them into diluted sulphuric acid, and then rubbing the mercury over them.

J. S. (Shrewsbury).—The formula suggested by Mr. Hallows for linimentum saponis, is given *in full* at page 420. We have tried it, and find it to answer perfectly.

A Member, who writes on the subject of Valerianate of Iron, is referred to an article on this subject in the present number.

Quassia.—Green Ink : Solution of Acetate of Copper, thickened with gum.

F.S.—(1 and 2.) The Pharmacopœia and any modern work on Chemistry. (3.) The astringent matter of the rose petal is with difficulty extracted by water, and therefore the infusion is now directed to stand for six hours. (4.) We have heard nothing recently of the new Pharmacopœia. (5.) Pills are silvered by putting them into a box with silver leaf and shaking them.

L.S.D.—Spongy platinum is made by calcining the double chloride of platinum and ammonium.

Z. Z.—The Students at the Laboratory are advised by the Professor respecting the books they should read during their progress. *Fownes's Manual of Chemistry* is a good work to commence with.

Omicron (*a Member?*) inquires "Whether there is any chance of getting the Society chartered?" [The date of the charter is February 19th, 1843. The other inquiries of our Correspondent are fully answered in the present number, and also in former numbers of this Journal.]

Juvenis.—(1.) The nature of the examinations is described in Vol. viii., No. 8, where advice is also given respecting the course of study. The appointment of Examiners in the Country has been duly considered, but is thought unadvisable. (2.) We have no formula for "Shaving Cream."

H. M. (Ipswich)—Cachou Aromatise. See vol. v., p. 380.

A. Allen (Truro).—Crystalline Cream for the Hair is made by melting spermaceti and oil of almonds together at a moderate heat, and cooling gradually without stirring. The proportions vary according to the temperature of the season.

Alpha (Blackburn).—Essence of Roses is made by dissolving Otto of Roses in spirit of wine. The proportions are optional.

A Chemist, M.P.S., has sent a Latin Aberdeen diploma to be translated. It would be foreign to the objects of this Journal to occupy half a page with matter of this kind.

Ignorantus.—The meaning of the term is silicate of alumina and glucina —the emerald.

We have no space for Mr. Coxworthy's communication. It is rather too speculative for our comprehension.

Advertisements to Mr. CHURCHILL, Princes Street, Soho.

Other Communications to the EDITOR, 338, Oxford Street, before the 20th of the month (if Answers be desired in the ensuing number).

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